India Non-Detriment Finding for Thresher Sharks *Alopias* spp. in the Indian Ocean | 2019 to 2022

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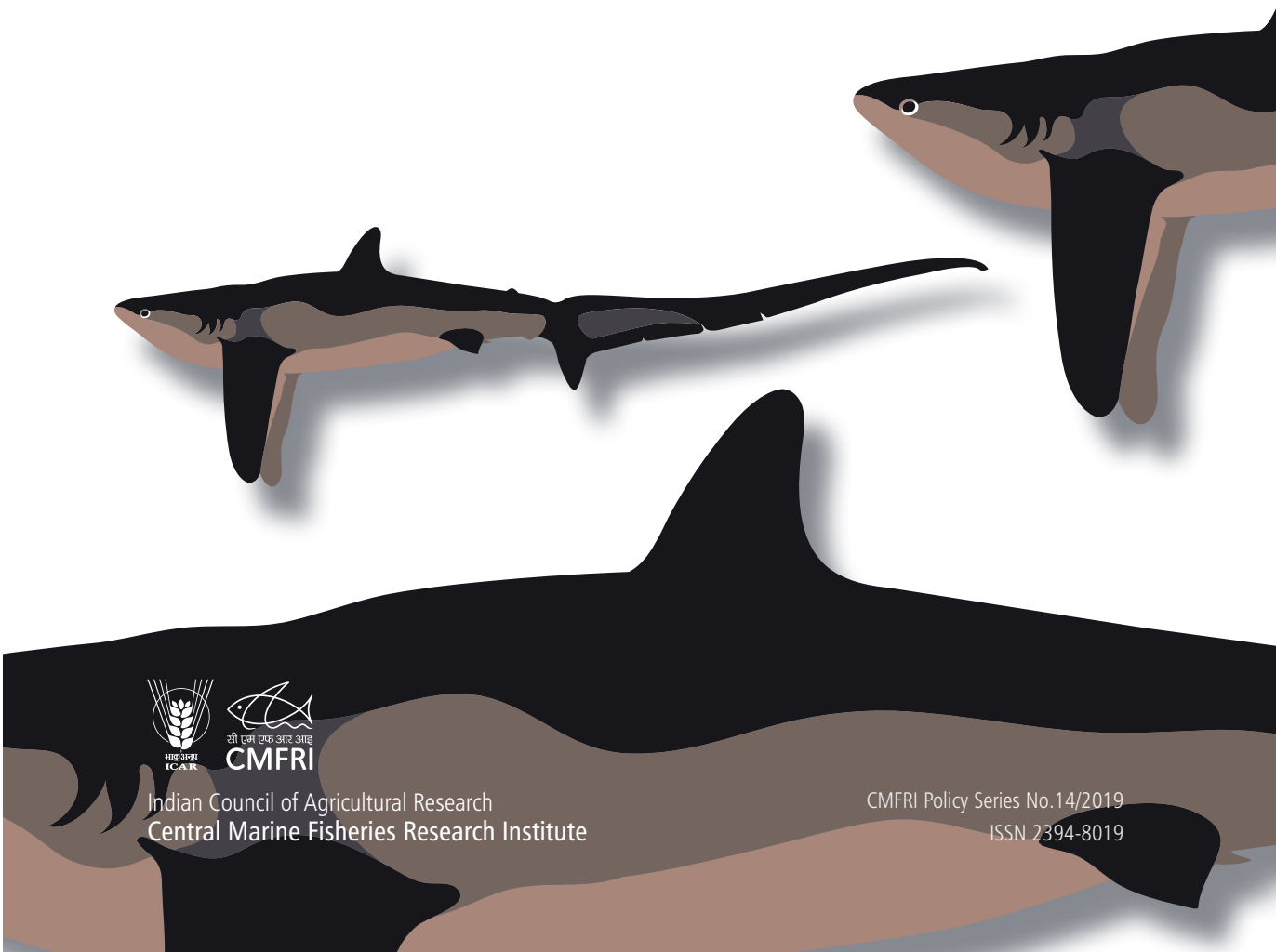

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India Non-Detriment Finding (NDF) for thresher sharks, *Alopias* spp., in the Indian Ocean

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Foreword

Four species of sharks and all species of devil rays were included in Appendix II of CITES (Convention on International Trade in Endangered Species of Wild Flora and Fauna) at the 17th Meeting of the Conference of the Parties (CoP17, Johannesburg) in 2016. Following CITES norms, India, like all other signatory countries, is required to carry out Non-Detriment findings studies to ensure that trade in these listed species does not threaten their survival.

ICAR-Central Marine Fisheries Research Institute, which is the recognized Scientific Authority of CITES in India for marine resources, has already published NDFs for three species of hammerhead sharks, the oceanic white tip shark and two species of *Manta* rays which were included in Appendix II of CITES in 2013. The current NDF is on thresher sharks *Alopias pelagicus* and *Alopias superciliosus*, which are harvested from the Indian EEZ and which were listed in Appendix II of CITES in 2016.

Thresher sharks are highly migratory pelagic predators, with a circumglobal distribution in tropical and temperate oceanic and coastal seas. Of the three species listed, two are known to occur in Indian waters while the occurrence of the third species, *Alopias vulpinus*, is doubtful. Thresher sharks are often seen in the landings along the Indian coast, with a higher incidence along the southern and the north-western coasts.

Although CITES regulations are legally binding on the signatory parties, it does not constitute or replace national laws, and the countries are advised to implement CITES regulations within the ambit of their own legislations. Considering the importance of thresher sharks in India's shark landings, and the fact that they have been categorized as Vulnerable in the IUCN Red List, this document should pave the way for effecting suitable fishery monitoring and management measures.

I congratulate the Demersal Fisheries Division for bringing out this valuable document. I also acknowledge with gratitude, the scientific assistance given by Sarah Fowler, Scientific Adviser, Vice-Chair for International Treaties, Save Our Seas, International Union for Conservation of Nature (IUCN) and Daniel Fernando, Co-founder, Blue Resources Trust, in the preparation of this document.

Dr. A. Gopalakrishnan
Director, CMFRI

Contents

Summary

This document was created by a designated Indian CITES Scientific Authority, the Central Marine Fisheries Research Institute (CMFRI), and is the result of a workshop that took place in April 2018 in Kochi, India. The following NDF guideline was used:

Mundy-Taylor, V., Crook, V., Foster, S., Fowler, S., Sant, G., and Rice, J. 2014. *CITES Non-detriment findings guidance for shark species. 2nd, revised version. A framework to assist Authorities in making Non-detriment Findings (NDFs) for species listed in CITES Appendix II.* Report prepared for the Germany Federal Agency for Nature Conservation (Bundesamt fur Naturschutz, BfN). Available at https://cites.org/eng/prog/shark/Information_resources_from_Parties_and_other_stakeholders.

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Experts:

Sarah Fowler, Scientific adviser, Vice Chair for International Treaties, Save Our Seas, International Union for Conservation of Nature (IUCN)

Daniel Fernando, Co-founder, Blue Resources Trust, Sri Lanka

Marie Saleem, Environmental Consultant, Reefscapers Pvt. Ltd., Maldives

Outcome:

This thresher sharks (*Alopias* spp.) NDF for India is "**positive with conditions**" to enable trade (of non-fin commodities) to continue while improvements are made to existing fisheries and trade management and monitoring systems, and while additional research activities and management measures are adopted as outlined in Section 6.

This NDF will be re-evaluated after 3 years, to gauge progress against the recommendations in Section 6 and update it with newly acquired data, before agreeing to a new NDF for 2023-2026.

Section 1. Preliminary considerations			
1.1 (a) Is the specimen subject to CITES controls?			
Species name	Product form	CITES Appendix	Source of identification
Pelagic thresher *(Alopias pelagicus)*	Fins (export of shark fins of all shark species prohibited from India since 2015).	Appendix II	Detached fins can be identified using: FAO shark fin guide or iSharkFin software (FAO, 2016a or http://www.fao.org/ipoa-sharks/tools/software/isharkfin/en/).
Bigeye thresher (*Alopias superciliosus*)	Meat (fresh and dried salted for human consumption) – more data is required to confirm international trade of meat. Cartilage (data lacking). Skin (international trade - leather) – more data is required. Liver oil (mixed with oil from other shark species, but domestic use only). Jaws & teeth (international trade).		Abercrombie, 2016: http://www.pewtrusts.org/~/media/assets/2016/09/pewsharkguidesilkyandthresherenglishprint.pdf. For whole animal identification: Pillai and Parakal, 2000. Kizhakudan *et al.*, 2015. FAO Guides and expert identification by CMFRI. ICAR-CMFRI, unpublished. Utilisation: Compagno, 1984b. Clarke *et al.*, 2006a. Akhilesh *et al.*, 2011
NEXT STEPS			
In view of the above, is the specimen subject to CITES controls?	YES		GO TO Question 1.1(b)
Concerns and uncertainties:	As the thresher sharks are landed whole, there is a low risk that this genus has been or will be incorrectly identified at landing sites, although species may be confused; species specific traceability is lacking in respect to thresher shark product trade.		
	Insufficient information is currently available on the utilisation or export of meat, jaws, oil, cartilage, and hide.		

1.1 (b) From which stock will the specimen be taken/was the specimen taken?		
	Description/comments	Sources of information
Ocean basin	Indian Ocean	FAO,1994 http://www.fao.org/DOCREP/003/T3740E/T3740E00.HTM
Stock location/ distribution/ boundaries (Map – see Appendix 1)	This NDF covers the pelagic and bigeye thresher sharks. The common thresher is unconfirmed in Indian waters (records may be misidentified pelagic threshers). Limited population data is available for the Indian Ocean. The existence of separate Indian Ocean and Pacific Ocean stocks is unconfirmed.	Amorim *et al.*, 2009. FAO,1994 http://www.fao.org/DOCREP/003/T3740E/T3740E00.HTM. IOTC-2015-WPEB11-19. Reardon *et al.*, 2009. Trejo, 2004.
Is this a shared stock (i.e. occurring in more than one EEZ[1] and/or the high seas)?	Yes, straddling stock ranging between India's EEZ, the high seas and likely other Indian Ocean EEZ's (e.g. Sri Lanka, Maldives).	www.iotc.org
If the stock occurs in more than one EEZ, which other Parties share this stock?	Thresher shark stocks occur in the EEZ of the other littoral states of the Indian Ocean. However, stock studies need to be conducted to check for multiple stocks in the region.	www.iotc.org
If a high seas stock, which other Parties fish this stock?	In addition to the above, the following IOTC Contracting Parties: China, Belize, European Union, Guinea, Japan, Republic of Korea, and Cooperating Non-Contracting Party (CNCP): Liberia.	www.iotc.org
Which, if any, RFB(s)[2] cover(s) the range of this stock?	With respect to the Indian Ocean region: * Indian Ocean Tuna Commission (IOTC), *Asia-Pacific Fishery Commission (APFIC), *The Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO), *Commission for the Conservation of Southern Bluefin Tuna (CCSBT), *Regional Organization for the Conservation of the Environment in the Red Sea and Gulf of Aden (PERSGA), * Regional Commission for Fisheries (RECOFI), * South Indian Ocean Fisheries Agreement (SIOFA), and *Southwest Indian Ocean Fisheries Commission (SWIOFC).	http://iotc.org http://www.apfic.org http://www.bobpigo.org https://www.ccsbt.org/ http://www.persga.org/ http://www.fao.org/fishery/rfb/recofi/en http://www.fao.org/fishery/rfb/siofa/en http://www.fao.org/fishery/rfb/swiofc/en

Are all Parties listed above (which fish or share the stock concerned) Members of the relevant RFB(s)?	Yes. They are Members or Cooperating Non-Contracting Parties of IOTC.	https://cites.org/eng/disc/parties/chronolo.php
	Most are CITES Parties and/or CMS, and some are also Signatories of the CMS Sharks MoU.	(http://www.cms.int/sharks/en/signatories-range-states)

1.2 Was (will) the specimen (be) legally obtained and is export allowed?		
Is the species:	Description/ comments	Sources of information
Protected under wildlife legislation, a regional biodiversity Agreement, or (for a CMS[1] Party) listed in CMS Appendix I?	Not protected under India's legislation or a regional agreement.	http://www.cms.int/sharks/en/species
	Sharks have to be landed with all fins attached (since 2013).	https://cites.org/eng/prog/shark/sharks.php#ts
	Appendix II of CMS (2014) and CMS MOU Sharks (2016).	https://www.cms.int/sharks/en
	Appendix II of CITES (2017).	http://www.fishbase.org/summary/SpeciesSummary.php?ID=2534&AT=common+thresher
	Annex I of the 1982 Convention on the Law of the Sea.	
Sourced from illegal fishing activities (e.g. in contravention of finning regulations, or where a TAC[2] is zero or exceeded)?	In compliance with RFB Resolution below; applies to fishing vessels on the IOTC Record of Authorised Vessels operating within the IOTC Area of Competence.	Resolution 12/09on the Conservation of Thresher Sharks (Family Alopiidae) caught in association with fisheries in the IOTC area of competence
Taken from a no-take marine protected area or during a closed season?	No.	
Taken in contravention of RFB recommendations, if any?	Measure applies to all fishing vessels on the IOTC Record of Authorised Vessels. Fishing Vessels flying the flag of an IOTC Member or CPC are prohibited from retaining on board, transhipping, landing, storing, selling or offering for sale any part or whole carcass of thresher sharks of all the species of the family Alopiidae. Exception: Scientific observers shall be allowed to collect biological samples from thresher sharks that are dead at haulback, provided that the samples are part of the research project approved by the IOTC Scientific Committee or WPEB.	Resolution 12/09 on the Conservation of Thresher Sharks (Family Alopiidae) caught in association with fisheries in the IOTC area of competence
Listed as a species whose export is prohibited?	No.	

Of concern for any other reason?	Regulation prohibits all export of shark fins from India.	Govt. of India. Notification number 110/(RE-2013) 2009-14, dt 6 Feb 2015 and 111/(RE-2013) 2009-14, dt 6 Feb 2015

NEXT STEPS		
In view of the above and the final section of the Worksheet for Question 1.1(b), was the specimen legally acquired and can exports be permitted?	YES	GO TO Question 1.3
Concerns and uncertainties:	Exports can only be permitted of non-fin products from India.	

[1] Convention on Migratory Species.

[2] Total Allowable Catch

1.3 What does the available management information tell us?

Part 1. Global-level information

	Description/comments	Sources of information
Reported global catch	Global reported catch has averaged 12,400 t/ annum over the past 10 years. It has declined from a peak of over 20,000 t in 2011 to less than 5,000 t in 2016. Two of the three largest nations reporting thresher shark catches fish in the Indian Ocean (Indonesia and Sri Lanka). Sri Lanka has not reported landings since 2012 due to introduction of legal protection for the species. India does not report species-specific shark catch to the FAO.	FAO. 2018. Fishery and Aquaculture Statistics. Global production 1950-2016 (FishstatJ): www.fao.org/fishery/statistics/software/fishstatj/en
Species distribution	Bigeye thresher (*A. superciliosus*): Circumglobal in distribution and seen in tropical and temperate seas (Compagno 2001); reported from Western Atlantic, Indo -Pacific and Eastern Pacific. These sharks show diel vertical migration (Weng and Block, 2001) and stay at depths of 200 to 500 m during the day and at 80 to 130 m at night (Nakano *et al.*, 2003).	Amorim, *et al.*, 2009:http://dx.doi.org/10.2305/IUCN.UK.2009- 2.RLTS.T161696A5482468.en Weng and Block, 2001. Nakano *et al.*, 2003. Reardon *et al.*, 2009: http://dx.doi.org/10.2305/IUCN.UK.2009- 2.RLTS.T161597A5460720.en Compagno, 2001. Fischer & Bianchi,1984. Evgeny, 2015. Raje *et al.*, 2007. Manojkumar and Pavithran., 2006. Joshi *et al.*, 2008.
	Pelagic thresher (*A. pelagicus*): Oceanic and wide-ranging in the Indo-Pacific, Indian Ocean; neritic to oceanic. Probably highly migratory and is epipelagic from the surface to at least 152 m depth (Compagno 2001, Fischer & Bianchi,1984).	
	Common thresher (*A. vulpinus*): The presence of the common thresher shark in the tropical Indian Ocean has been questioned by Evgeny, 2015. However sporadic occurrences have been reported from Indian waters (Manojkumar and Pavithran, 2006; Joshi *et al.*, 2008). IOTC suggests that records of the common thresher may be misidentified pelagic threshers.	
Known stocks/ populations	Two confirmed species of thresher shark occur in the Indian Ocean: bigeye thresher (*A. superciliosus*) and pelagic thresher (*A. pelagicus*). Among the bigeye thresher sharks of the Indian Ocean and Pacific Ocean, existence of genetic differentiation is unknown (Trejo, 2004; Amorim *et al.*, 2009).	Amorim *et al.*, 2009. Trejo, 2004.

Main catching countries	Two of the three largest nations reporting thresher catches fish in the Indian Ocean (Indonesia and Sri Lanka). Sri Lanka has not reported landings since 2012, since introducing legal full protection for the species. India does not report species-specific shark catch to the FAO. A small longline bycatch is reported by France, Portugal and the Maldives. As per IOTC supporting documents, only two CPCs (India and Sri Lanka) have reported catches of pelagic thresher sharks in their longline and gillnet fisheries.	FAO. 2018. Fishery and Aquaculture Statistics. Global production 1950-2016 (Fishstat): www.fao.org/fishery/statistics/software/fishstatj/en. www.iotc.org.
Main gear types by which the species is taken	Taken as bycatch in longlines and gillnets. Not taken by trawls.	Raje *et al.*, 2007.
Global conservation status	The bigeye thresher (*A. superciliosus*) is classified as Vulnerable according to the IUCN (Amorin *et al.*, 2009). The regional assessment of Endangered Sharks in the Arabian Seas, covering the western half of India's EEZ categorises them as Endangered (Jabado *et al.* 2017). The pelagic thresher (*A. pelagicus*) is classified as Vulnerable globally according to IUCN (Reardon *et al.*, 2009). The regional assessment of Endangered Sharks in the Arabian Seas, covering the western half of India's EEZ categorises them as Endangered (Jabado *et al.* 2017).	Amorim, A. *et al.* 2009: http://dx.doi.org/10.2305/IUCN.UK.2009- 2.RLTS.T161696A5482468.en Jabado *et al.* 2017 Reardon *et al.* 2009:http://dx.doi.org/10.2305/IUCN.UK.2009- 2.RLTS.T161597A5460720.en
Multilateral Environmental Agreements	Convention on the Conservation of Migratory Species (CMS) Appendix II (2014). CMS Migratory Sharks MOU (2016). CITES Appendix II (2017). IOTC Resolution 12/09 on the Conservation of Thresher Sharks (Family Alopiidae) caught in association with fisheries in the IOTC area of competence.	http://www.cms.int/sharks/en/species https://cites.org/eng/prog/shark/sharks.php#ts https://www.cms.int/sharks/en www.iotc.org
Part 2. Stock/context-specific information		
Stock assessments	Considerable uncertainty for bigeye and pelagic thresher sharks due to lack of data for assessment. Though stock assessments for the species has not been done, growth and mortality rates for *A. superciliosus* from eastern Indian Ocean are available. Benjamin *et al.*, (2014, abstract), reported k=0.43 year-1 in 2011-13 and fishing mortality (F) as 0.93.	www.iotc.org Benjamin *et al.*, 2014

Main management bodies	National fisheries management agencies in India: Ministry of Agriculture, the Ministry of Environment, Forest and Climate Change, and the State Departments of Fisheries. IOTC: Working Party on Ecosystems and Bycatch; Scientific Committee; Commission. CITES, CMS, BOBLME (Phase 2), CBD, and FAO–IPOA.	www.iotc.org
Cooperative management arrangements	Potentially through the CMS Migratory Sharks MoU. The Areas Beyond National Jurisdiction (ABNJs) 'Common Oceans Tuna Project' is addressing management issues in the High Seas, including sustainable management of tuna fisheries and biodiversity conservation. One component of the ABNJ Tuna Project addresses the take of sharks and rays. The IOTC and WCPFC are trialling a Bycatch Data Exchange Protocol Template (BDEP) that aims to provide a framework for consistent management of bycatch data within RFMOs. A 2016 IOTC report recommends that this BDEP continue in 2017 for the Indian Ocean (IOTC–2016–WPDCS12–28 Rev_1).	IOTC–2016–WPDCS12–28 Rev_1
Non-membership of RFBs	None – all main catching countries are IOTC Members.	
Nature of harvest	Thresher sharks are taken in Indian waters as a secondary (retained) bycatch of drift gillnet and longline fisheries targeting large pelagics. Sri Lanka formerly took substantial quantities of thresher shark bycatch but the species are now prohibited nationally. Elsewhere in the Indian Ocean, threshers are taken by other IOTC members in industrial pelagic longline fisheries for tuna and swordfish. Indirect threats include entanglement in artificial FADs and ghost nets.	
Fishery types	In India, the majority of thresher sharks are caught as secondary catch in longline and drift gillnet fisheries for large pelagics. By other fleets in the Indian Ocean they are taken in tuna longline and gillnet fisheries.	

Management units	The IOTC is the management body for the Indian Ocean. India manages shark stocks through state and national fisheries authorities via the Marine Fisheries Regulation Acts (MFRA) of States and the National Policy on Marine Fisheries (2017) of the Govt. Of India. State Government agencies in India: State Fisheries Departments (SFDs) Agencies of the Govt. Of India: Ministry of Agriculture, Cooperation & Farmers Welfare (MoA), Ministry of Environment, Forests and Climate Change (MoEF&CC).	http://www.iotc.org https://www.ccsbt.org https://cof.gujarat.gov.in/contact-us.htm https://fisheries.maharashtra.gov.in/ http://fisheries.goa.gov.in/ http://www.karnataka.gov.in/fisheries/Pages/Home.aspx http://www.fisheries.kerala.gov.in/ http://www.fisheries.tn.gov.in/ https://www.py.gov.in/knowpuducherry/dept_fisheries.html http://apfisheries.gov.in/ http://www.odishafisheries.com/ http://www.wbfisheries.gov.in/wbfisheries/do/Forwordlink?val=32 http://agricoop.nic.in/# http://www.moef.nic.in/ http://dahd.nic.in/about-us/divisions/fisheries http://dahd.nic.in/news/notification-national-policy-marine-fisheries-2017
Products in trade	Meat is used fresh and dried for domestic use. The extent of international meat trade (if any) is currently unknown. Shark fins cannot legally be exported from India. Jaws, teeth, cartilage and skin enter international trade. Oil is mixed with the liver oil of other shark species, but thought to be utilised domestically.	Govt. of India. Notification number 110/(RE-2013) 2009-14, dt 6 Feb 2015 and 111/(RE-2013) 2009-14, dt 6 Feb 2015. Kizhakudan *et al.*, (2015)

Part 3. Data and data sharing		
Reported national catch(es)	All India Landings of *Alopias* spp.(t) 2007: 238 2008: 363 2009: 433 2010: 216 2011: 259 2012: 229 2013: 347 2014: 319 2015: 327 2016: 482	National Marine Fisheries Data Centre, ICAR-CMFRI unpublished data.
Are catch and/or trade data available from other States fishing this stock?	Catch data are available from Sri Lanka (prior to prohibition) and Indonesia. India: Gujarat is one of the major shark fishing state of India. Small sized thresher sharks are utilized for fresh consumption at the rate 2.3-4.6 USD/kg- based on degree of freshness. Larger ones are dried and sold at a price of 2-3 USD/kg. Nearly 30-40 t of thresher sharks are dried annually in Gujarat. Oil extracted from shark is used for polishing boats locally, sold at the rate of 154 USD-per barrel. About 800-1000 kg goes for drying in the month of January, whereas in the other months it is in the range of 200-300 kg.	ICAR- CMFRI 2017 (Shikha R, ICAR-CMFRI, personal observation)
Reported catches by other States	Indonesia and Sri Lanka (the latter prior to prohibition) have reported substantial catches from the Indian Ocean to FAO. Very small amounts are reported sporadically by France, Portugal and Maldives (the latter is a bycatch of tuna longlines)	
Catch trends and values	A declining Indian Ocean catch trend from the late 1990s led to the adoption of the IOTC Thresher shark conservation measures.	
Have RFBs and/or other States fishing this stock been consulted during or contributed data during this process?	No. This NDF will be made public in order to enable other range states to make informed decisions for the management of the stock as a whole for the Indian Ocean	

Major sources include: Reardon *et al.* (2009); Jabado *et al.* (2017); FAO (1994); Raje *et al.* (2007); Compagno (2001); Fischer & Bianchi (1984); Trejo (2004); Nakano *et al.* (2003); Weng and Block (2001), FAO (2018); Young *et al.* (2015); FAO (1994)

Section 2. Intrinsic biological and conservation concerns		
2.1 What is the level of intrinsic biological vulnerability of the species?		
Intrinsic biological factors	Level of vulnerability	Indicator/metric
a) Median age at maturity	Low	
	Medium✓	*Alopias pelagicus*: 10.4 for males and 13.2 for females from Indonesian catches (Drew *et al.*, 2015).
		Alopias superciliosus: 8 years for males and 6 years for females
	High	
	Unknown	
b) Median size at maturity	Low	
	Medium	
	High✓	*Alopias pelagicus*: Length at maturity was 264.8 cm TL for males and 285.3 cm TL for females in Indonesian catches (White, 2007). *A. superciliosus*: LT50 for female is 322 cm total length 263.50 cm for male (Varghese *et al.*, 2016)
	Unknown	
c) Maximum age/ longevity in an unfished population	Low	
	Medium✓	*Alopias superciliosus*: Tmax 20 years (Liu *et al.*, 1998) from Taiwan
	High ✓	*Alopias pelagicus*:Tmax 28.5 years (Liu *et al.*, 1999) from Taiwan
	Unknown	
d) Maximum size	Low	
	Medium	
	High✓	*Alopias pelagicus*: Maximum size in Indonesian catches was 326 cm TL (White, 2007), 319 cm TL from India (Varghese *et al.*, 2016)
		Alopias superciliosus: Maximum size reported is 470 cm from Western Indian Ocean, (Pillai and Parakkal, 2000), 361 cm (females) and 327 cm (males) from the Eastern Arabian Sea during 2013-14 and 314 cm (DFD–ICAR-CMFRI-2017, unpublished) from Eastern Bay of Bengal, Linf 383.25 cm (Benjamin *et al.*, 2014)
	Unknown	
e) Natural mortality rate (M)	Low	
	Medium	
	High ✓	*Alopias superciliosus*: 0.5 from south west coast of India (Benjamin *et al.*, 2014)
	Unknown	
f) Maximum annual pup production (per mature female)	Low	
	Medium✓	*Alopias pelagicus*: 2 pups per litter (Liu *et al.*, 1999, White ,2007). May give 40 embryos per female lifetime, if it breeds once every year (Liu *et al.*, 1999)
		Alopias superciliosus:2 pups per litter (Benjamin *et al.*, 2014; Varghese *et al.*, 2016)
	High	
	Unknown	

g) Intrinsic rate of population increase (r)	Low	
	Medium	
	High✓	*Alopias pelagicus*: 0.05 as estimated from Drew *et al.* (2015); 2-4% annual rate of population increase (Reardon *et al.*, 2009)
		Alopias supercilious: Exceptionally low potential annual rate of population increase (0.002, Reardon *et al.*, 2009)
	Unknown	
h) Geographic distribution of stock	Low✓	*Alopias pelagicus*: Oceanic, widespread in the Indo-Pacific and highly migratory (Reardon *et al.*, 2009)
		A. superciliosus: Circumglobal distribution. (Froese and Pauly, 2016)
	Medium	
	High	
	Unknown	
i) Current stock size relative to historic abundance	Low	
	Medium	
	High✓	*Alopias pelagicus*: Decreasing trend (Reardon *et al.*, 2009). For India landings show an increasing trend (National Marine Fisheries Data Centre, ICAR-CMFRI unpublished data)
		Compilation of all sources of trend data for *Alopias* in the Atlantic indicates a decline exceeding 80% from virgin biomass in the 1950s, (Anon 2016. CITES CoP17 Inf. 14 (https://cites.org/com/cop/17/inf/index.php)).
		Catch estimates for bigeye thresher shark *A. superciliosus* in the Indian Ocean for 2010 to 2012 shows that catch has increased from 8 t to 465 t (IOTC–2013–SC16–ES22[E]). Landings of *A. superciliosus* contributed to 11.85% of the total shark landings of India during 2016 (Sathianandan, 2017) and 37 tonnes i.e. 33% of the total shark landings in 2017 from the south east coast of India (DFD-CMFRI, unpublished data)
	Unknown	
j) Behavioural factors	Low	
	Medium	
	High✓	*Alopias pelagicus*: Has been heavily fished by pelagic fisheries operating in the Indian Ocean; is highly vulnerable to gillnets and longlines, with easily getting its tail entangled in the gear. In Indonesian waters, it has been fished heavily by tuna longliners. IOTC also reports that it has been caught heavily by Spanish longline fleets in the Indian Ocean. It is also an important catch in Central Pacific (Reardon *et al.*, 2009)
		Alopias superciliosus: Highly migratory (UNCLOS, Annex 1)
	Unknown	

k) Trophic level	Low	
	Medium	
	High✓	*Alopias superciliosus*: 4.5 Based on diet studies (Froese and Pauly, 2015)
		Alopias pelagicus: 4.5 Based on diet studies (Froese and Pauly, 2015)
	Unknown	

SUMMARY for Question 2.1

Intrinsic biological vulnerability of species

Provide an assessment of the overall intrinsic biological vulnerability of the species (tick appropriate box below). Explain how these conclusions were reached and the main information sources used.

High✓	Medium	Low	Unknown

Please refer to Appendix 5 for further detail on the life history by region for *A. pelagicus*.

- The pelagic thresher shark is an oceanic and epipelagic shark, with wide-ranging distribution in the Indian and Pacific Oceans. It is thought to be highly migratory.
- Its critical habitats are unknown in the Indian Ocean region.
- Some information exists on reproduction of pelagic thresher shark especially from Taiwan and Indonesia. These studies have reported aspects of its reproductive biology, age and size at maturity and fecundity. There are no corresponding studies from the Indian Ocean region.
- They are long lived (30 years), mature relatively late (13.2 years), and have very few offspring (2 pups per litter). These life history characteristics make it highly vulnerable to overfishing.
- These sharks have been caught heavily by tuna longliners in the Indian Ocean and the species is especially vulnerable to both longlines and gillnets.

This conclusion is derived primarily from: Liu *et al.*, (1999), Reardon *et al.*, (2009), White (2007) and Drew *et al.*,(2015)
Data on life-history parameters from Eastern Arabian Sea and Bay of Bengal and unpublished CMFRI data.
The intrinsic biological vulnerability of the species is high, due to its low productivity (Ferretti *et al.* 2008, Cortes *et al.* 2009), and its susceptibility to pelagic longline fisheries is high.

Please refer to Appendix 5 for further details on the life history by region for *A. superciliosus*

- The big eye thresher shark is circumglobal species oceanic and coastal shark with wide-ranging distribution in the Indian, Atlantic and Pacific Oceans and thought to be highly migratory.
- Its critical habitats are unknown in the Indian Ocean region.
- Information exists on reproduction of bigeye thresher shark especially from Indian waters and Taiwan. These studies have reported aspects of its reproductive biology, size at maturity and pups. They are long lived (20 years), mature relatively late (9 -10 years), and have very few offspring (2 pups per litter). These life history characteristics make them highly vulnerable to overfishing.
- These sharks have been caught by longliners and gillnetters in the Indian EEZ and the species is especially vulnerable to both longlines and gillnets.

This conclusion is derived primarily from: Benjamin *et al.* (2014), Varghese *et al.* (2009) and unpublished CMFRI data; Cortes, 2002; Cortes *et al.* (2009); Cortes *et al.* (2010); Cortes *et al.* (2015); Ferretti *et al.* (2008);ICCAT Shark Species Group report (2014); Fernandez-Carvalho *et al.*,(2011); Pillai and Parakal (2000); Varghese *et al.*, (2016); Raje*et al.* (2007); Fischer and Bianchi (1984); Sathianandan (2017)

2.2 What is the severity and geographic extent of the conservation concern?		
Conservation concern factors	Level of severity/ scope of concern	Indicator/metric
Conservation or stock assessment status	Low	
	Medium	
	High✓	No stock assessments.
	Unknown	
	Comments:	
	Some estimates of age and growth parameters available as well as exploitation rates for *A. superciliosus* from eastern Indian Ocean (Benjamin *et al.,* 2014, Drew *et al.,* 2015). However, there are no stock assessments of either species in the area, the IUCN Red List status has recently been uplisted for the NE Atlantic and Mediterranean to Endangered. The regional Red List assessment for Arabian Sea region listed both *A. superciliosus* and *A. pelagicus* as Endangered (Jabado *et al.*, 2017)	
Population trend	Low	
	Medium	
	High✓	Declining trends in population
	Unknown	
	Comments:	
	Anon 2016. (CITES CoP17 Inf. 14 (https://cites.org/com/cop/17/inf/index.php)) suggest a decline of >80% from baseline in the Atlantic.	
	High probability that there has been a serious depletion of the global population of the pelagic thresher sharks (Reardon *et al.*, 2009)	
Geographic extent/ scope of conservation concern	None	
	Low	
	Medium	
	High✓	In the area considered.
	Unknown	
	Comments:	
	Although IOTC has no retention policy in Indian Ocean (Resolution 12/09), the effectiveness in reducing the bycatch mortality of thresher sharks is doubtful. Thresher sharks are also targeted in Taiwan (White, 2007).	

SUMMARY for Question 2.2			
Severity and geographic extent of conservation concern			
Assess the overall severity and geographic extent of the conservation concern for this species or stock (tick appropriate box below). Explain how these conclusions were reached and main sources of information used.			
High✓	Medium	Low	Unknown

Explanation of conclusion and sources of information used:

This is a low productivity genus that is not subject to very high fishing pressure. Population trends in the other major ocean basins, combined with limited trend data and information on threats from the Indian Ocean, indicate that the status of the Indian Ocean stock is also of concern. The conservation needs of and threats to this species are therefore high in the Indian Ocean. Given the importance of this species in various fisheries and the lack of limited data to evaluate the population trend in the Indian Ocean. Big eye thresher shark population should be constantly monitored to assure their conservation and wise management.

This conclusion is derived primarily from Pillai and Parakal (2000) Varghese at al. (2016), Fischer and Bianchi (1984), Sathianandan (2017), Benjamin *et al.* (2014).

Section 3. Pressures on species

3.1 What is the severity of trade pressure on the stock of the species concerned?

Factor	Level of severity of trade pressure	Indicator/metric		
(a) Magnitude of legal trade	Low	Export of shark fins for all shark species from India is prohibited. There may be limited legal trade in thresher shark meat and other products (skin, cartilage), but data are not recorded.		
	Medium	30-40 tonnes of thresher shark meat is dried annually, mostly in Veraval, Gujarat. There is also a market for oil (for treating boats). Domestic consumption demand of salted shark meat is high in southern states of India, where exclusive utilisation of all threshers for salting (4-7 USD/kg) and fresh meat demand of thresher is low. Species specific trade data is limited.		
	High	See below for global fin trade through Hong Kong. Fresh thresher shark meat is valued in the USA, Europe and perhaps other countries.		
	Unknown			
	Level of confidence:			
	Low		Medium	High

Reasoning

The quantity of thresher shark fins (all three species) identified in Hong Kong (Special Administrative Region) fin markets in the early 2000s equated to between 350,000 and 3.9 million individual thresher sharks, or a biomass of 12,000 to 85,000 t being killed and traded per year. This comprised roughly 2.3% of the estimated global shark fin trade. Much of this trade goes through Hong Kong (SAR), where thresher shark fins are traded as "wugu"; the majority of fins in this category are from threshers although some mixing with longfin mako Isurus paucus has been documented (Clarke *et al.*, 2006).

Threshers comprised (0.1%) of samples analysed in a 2014 study of shark fins processed in Hong Kong (Fields *et al.*, 2017). This study is continuing and will provide longer-term data on trends in proportions of species in trade.

Catches of thresher shark reported by Sri Lanka peaked at over 1,000 tonnes in 2000, then declined >90% by 2009, followed by a brief increase to 800 tonnes immediately before legal protection was adopted (Anon, 2016). The largest reporting nation is Indonesia. Its catches peaked at around 20,000 t in 2011 and have since declined to slightly over 4,000 t. Most of this decline has taken place in the Pacific Ocean. Indian Ocean catches have decreased slightly from around 4,900 t in 2013 to 4,000 in 2016 (FAO FishStat 2018).

In India, all sharks are retained (excluding protected species) for their meat, fins or oil, and complete utilisation of sharks.

(b) Magnitude of illegal trade	Low		
	Medium		
	High		
	Unknown		
	Level of confidence:		
	Low	Medium	High
Reasoning:			
Shark fin exports from India have been prohibited since 2015. Some shipments to Hong Kong have been reported as originating from India (TRAFFIC). Illegal fin trade can be suspected, fins may be hidden in shipments of dried fish products (Anon, 2017). Sri Lanka has also seized shark fin and sea cucumbers smuggled from India for legal re-export from Sri Lanka (Anon, 2018).			

3.2 What is the severity of fishing pressure on the stock of the species concerned?			
Factor	Level of severity of fishing pressure	Indicator/metric	
(a) Fishing mortality (retained catch)	Low		
	Medium		
	High	Landings and trend data in this region and other oceans	
	Unknown		
	Level of confidence:		
	Low	Medium	High
Reasoning:			
All sharks captured in Indian fisheries are retained. Species-specific catch and trend data are lacking in India. Despite the lack of data, there is some anecdotal information suggesting that shark abundance has declined over recent decades (Varghese *et al.* 2016). At Cochin, *Alopias superciliosus* formed 25% sharks landed in 2008 (Akhilesh *et al.*, 2011) There is no substantial information on species-specific mortality rates – more research is needed. About 1,94,490 vessels are operating in the Indian EEZ, sharks occur as targeted and bycatch, but not all of these units engage in shark fishing. Sri Lanka, which used to catch large quantities of thresher sharks, has now legally protected these species. There were steep declines in adjacent Sri Lankan waters prior to the protection of threshers there. Indonesia is a major fisher of thresher sharks in the Indo-Pacific. Catches from the Indian Ocean have declined slightly; catches from the Pacific virtually ceased after 2013. Stock assessments in other oceans have identified serious declines. RFMO prohibitions may have resulted in declining pressure, but bycatch is unaffected by this measure and discard mortality is very high.			

(b) Discard mortality	Low	N/A in Indian waters; there are virtually no discards of sharks from Indian fisheries.		
	Medium			
	High	Discard mortality of threshers is very high in gillnets and longlines (IOTC)		
	Unknown			
	Level of confidence:			
	Low		Medium	High
Reasoning:				
In India discard mortality is very low because all sharks caught are retained (total mortality is therefore high). There are major concerns about high levels of discard mortality by other fleets operating in the Indian Ocean and affecting the same stock. IOTC notes that threshers are discarded dead if not retained. (IOTC–2013–SC16–ES22. Status of the Indian Ocean bigeye thresher shark (BTH: *Alopias superciliosus*); IOTC–2013–SC16–ES23. Status of the Indian Ocean pelagic thresher shark (PTH: *Alopias pelagicus*).				
(c) Size/ age/ sex selectivity	Low			
	Medium			
	High			
	Unknown	No data on size structure of fisheries catches.		
	Level of confidence:			
	Low		Medium	High
Reasoning:				
Size range of this species in fishery along Indian coast is: *Alopias superciliosus*: 120-470 cm *Alopias pelagicus*: 120-319 cm				
(d) Magnitude of illegal, unreported and unregulated (IUU) fishing	Low			
	Medium			
	High			
	Unknown	Information about this factor is unavailable		
	Level of confidence:			
	Low		Medium	High
Reasoning:				
Thresher sharks are taken by a range of net and line fisheries. There are some concerns about the volume of sharks possibly extracted when taking into account the magnitude of the "Not elsewhere included" (nei) sharks, provided by IOTC.				

Section 4. Existing management measures		
Preliminary compilation of information on existing management measures		
Existing management measures	Is the measure generic or species-specific?	Description/comments/sources of information
(SUB-) NATIONAL		
Fins-attached policy	Generic	In August 2013, the Ministry of Environment and Forests (Wildlife Division) approved a policy advisory by ICAR-CMFRI on shark finning (vide F. No4-36/2013WL, 21 August 2013), prohibiting the removal of shark fins on board a vessel in the sea, and advocating landing of the whole shark
Ban on shark fin export – Dept of Commerce of Ministry of Commerce and Industry	Generic	The Union Ministry of Commerce and Industry prohibited the export of fins of all species of shark, by way of a notification on February 6 2015 (Notification No. 110 (RE-2013)/2009-2014) inserting a new entry in 'Chapter 3 of Schedule 2 of ITC (HS) Classification of Export and Import Items.' The new entry (31 A) resulted in the ban on export of all shark fins.
Seasonal ban on mechanized fishing	Generic	Closure of mechanized fishing activities for 60 days from 15th April to 15th June along east coast and 1st June to 31st July along west coast (both days inclusive), implemented through State MFRAs.
No take zones	Generic	There are 33 Marine Protected Areas where fishing activities where fishing activities are regulated (Singh, 2003).
Gear-specific regulations	Generic	Regulation of mesh size, restrictions on operation of certain gears like ring seines, purse seines and pair trawling, implemented through State MFRAs. http://indianfisheries.icsf.net/en/page/827-Indian%20Legal%20Instruments.html http://old.icsf.net/icsf2006/uploads/resources/legalIndia/pdf/english/state/1112187832409***Gujarat_Marine_Fisheries_Rules_2003.PDF http://old.icsf.net/icsf2006/uploads/resources/legalIndia/pdf/english/state/1112240177836***Maharashtra_Marine_Fishing_Regulation_Rules,_1982.PDF http://164.100.150.120/mpeda/pdf/state_mfras/mfra_goa.pdf http://164.100.150.120/mpeda/pdf/state_mfras/mfra_karnataka_1987.pdf http://164.100.150.120/mpeda/pdf/state_mfras/mfra_kerala.pdf http://164.100.150.120/mpeda/pdf/state_mfras/mfra_tamil_nadu.pdf http://old.icsf.net/icsf2006/uploads/resources/legalIndia/pdf/english/state/1165227972133***Andra_Pradesh_Marine_Fishing_Regulation_Rules_1995_Amendment_dated_26th_October_2004.PDF http://164.100.150.120/mpeda/pdf/state_mfras/mfra_orrissa.pdf http://old.icsf.net/icsf2006/uploads/resources/legalIndia/pdf/english/state/1112241236819***West_bengal_Marine_Fishing_Regulation_(Amendment)_Rules,_1998.PDF

Existing management measures	Is the measure generic or species-specific?	Description/comments/sources of information
REGIONAL/INTERNATIONAL		
Resolution 12/09 on the Conservation of Thresher Sharks (Family Alopiidae) caught in association with fisheries in the IOTC area of competence.	Species-specific	Measure applies to all fishing vessels on the IOTC Record of Authorised Vessels. Fishing Vessels flying the flag of an IOTC Member or CPC are prohibited from retaining on board, transhipping, landing, storing, selling or offering for sale any part or whole carcass of thresher sharks of all the species of the family Alopiidae. Exception: Scientific observers shall be allowed to collect biological samples from thresher sharks that are dead at haulback, provided that the samples are part of the research project approved by the IOTC Scientific Committee or WPEB
IOTC Resolution 15/01 on the recording of catch and effort data by fishing vessels in the IOTC area of competence	Generic	Para. 1. Each flag CPC shall ensure that all purse seine, longline, gillnet, pole and line, handline and trolling fishing vessels flying its flag and authorized to fish species managed by IOTC be subject to a data recording system. Para. 10 (start). The Flag State shall provide all the data for any given year to the IOTC Secretariat by June 30th of the following year on an aggregated basis.
IOTC Resolution 11/04 on a regional observer scheme	Generic	Para. 10. Observers shall: b) Observe and estimate catches as far as possible with a view to identifying catch composition and monitoring discards, by-catches and size frequency.
IOTC Resolution 15/02 mandatory statistical reporting requirements for Contracting Parties and Cooperating Non-Contracting Parties (CPCs)	Species-specific	Para. 2. Estimates of the total catch by species and gear, if possible quarterly, that shall be submitted annually as referred in paragraph 7 (separated, whenever possible, by retained catches in live weight and by discards in live weight or numbers) for all species under the IOTC mandate as well as the most commonly caught elasmobranch species according to records of catches and incidents as established in Resolution 15/01 on the recording of catch and effort data by fishing vessels in the IOTC area of competence (or any subsequent superseding Resolution).
IOTC Resolution 05/05 concerning the conservation of sharks caught in association with fisheries.	Species-specific and generic	Para. 1. CPCs shall annually report data for catches of sharks, in accordance with IOTC data reporting procedures, including available historical data.
Superseded by IOTC Resolution 17/05.		Para. 3. CPCs shall take the necessary measures to require that their fishermen fully utilise their entire catches of sharks. Full utilisation is defined as retention by the fishing vessel of all parts of the shark excepting head, guts and skins, to the point of first landing.

4.1 Are existing management measures appropriately designed and implemented to mitigate pressures affecting the stock?				
Factor	Existing management measure(s)	Relevant monitoring, control and surveillance (MCS) measure(s)	Overall assessment of compliance regime	
TRADE PRESSURE				
(a) Magnitude of legal trade	In 2015, Notification No. 110 (RE-2013)/2009-2014) Shark fin export ban, 31 A in 'Chapter 3 of Schedule 2 of ITC (HS) Classification of Export and Import Items.' CITES Appendix II listing	Exports must be declared. Customs inspections of a random selection of containers is undertaken at point of export.	Unknown (no information on compliance)	
		Wildlife Crime Control Bureau is responsible for regulation/ monitoring of wildlife trade.	Poor (limited relevant compliance measures in place)	
			Moderate (some relevant compliance measures in place)	✓
		Legal acquisition findings, NDFs, Introductions from the Sea certificates, Export Permits	Good (comprehensive relevant compliance measures in place)	
	Reasoning/comments:			
	The species is prohibited in Sri Lanka and should not be landed or traded. No information from other states fishing in the Indian Ocean. The market demand for both sharks and rays is strong (MRAG, 2012).			
(b) Magnitude of illegal trade	As above.	In general trade is monitored in different levels and actions taken according to national laws by Central Board of Excise and Customs and Wildlife Crime Control Bureau	Unknown (no information on compliance)	
		There have been some seizures in Sri Lanka and Hong Kong of smuggled shark fins from India.	Poor (limited relevant compliance measures in place)	
		Hong Kong Customs records imports by country, including from India. Imports have declined slightly in 2016, after the fin export ban. No data available yet for 2017.	Moderate (some relevant compliance measures in place)	✓
			Good (comprehensive relevant compliance measures in place)	
	Reasoning/comments:			

IOTC Resolution 17/05 on the conservation of sharks caught in association with fisheries managed by IOTC.	Generic	Para. 2. Full utilisation of shark catches, with the exception of prohibited species.
		Para. 3. Prohibits the removal of fins on board vessels and the landing or carrying of fins that are not naturally attached before the point of first landing.
		Para. 6. CPCs shall report data for catches of sharks, in accordance with IOTC data reporting procedures.
		Para. 11. CPCs shall undertake research to make fishing gear more selective, look into prohibiting wire leaders, improve knowledge on biological data of sharks, mating/pupping areas and improve handling practices.
IOTC resolution 17/08. FADs management plan	Generic	No measures adopted in India (no tuna purse seine FAD fisheries).
CMS	Species-specific	Listing of Thresher sharks on Appendix II of CMS in 2014.
CITES	Species-specific	Listing of Thresher sharks on Appendix II of CITES in 2016.

	Letter from WWF India to MoEF and CC regarding potential illegal shark fin export- from India to Hong Kong, dated 18th April 2017- reports that from 2015-16, 139558 kg of dried shark fin with value of Hong Kong dollar 49562000/- was exported from India or via other countries to Hong Kong and in Jan-Feb 2017, about 1280 kg of suspected scheduled hammerhead sharks and oceanic white tip sharks were seized in four containers one being from India without any relevant permits attached.			
	Hong Kong Customs trade data for imports from India, 1998-2016, peaked at over 430,000 kg in 2000 and then fell to <100,000 kg in 2007, recovered slightly for a few years and declined again to below 100,000 kg in 2012. By 2015, imports from India were 80,850 kg, and fell after the export ban to 58,700 kg (HK Customs data provided by Bloom).			
FISHING PRESSURE				
(a) Fishing mortality (retained catch)	Closed seasons for all mechanised fisheries.	No on-board observer programme.	Unknown (no information on compliance)	
	No take zones	Port monitoring takes place.	Poor (limited relevant compliance measures in place)	✓
	Gear-specific regulations	Logbooks (limited availability, if at all)	Moderate (some relevant compliance measures in place)	
	IOTC Resolution 12/09 on conservation of Thresher Sharks		Good (comprehensive relevant compliance measures in place)	
	Reasoning/comments: IOTC compliance continues to be improved.			

	IOTC Resolution 17/05 concerning the conservation of sharks caught in association with fisheries.	No commercial level tuna FADs used in Indian waters; no shark discards from Indian fisheries – no specific management measures (Kizhakudan *et al.*, 2015)	Unknown (no information on compliance)	✓
(b) Discard mortality	National Fins attached policy (vide F. No4-36/2013WL, 21 August 2013)		Poor (limited relevant compliance measures in place)	
	IOTC FAD Resolution		Moderate (some relevant compliance measures in place)	
			Good (comprehensive relevant compliance measures in place)	
	Reasoning/comments: It is assumed that all dead sharks caught, except prohibited species, are retained on-board.			
		Monitoring of sizes landed in some maritime states along Indian coast.	Unknown (no information on compliance)	✓
(c) Size/ age/ sex selectivity				
			Poor (limited relevant compliance measures in place)	
			Moderate (some relevant compliance measures in place)	
			Good (comprehensive relevant compliance measures in place)	
	Reasoning/comments:			
	NA.			
	Bay of Bengal IUU fishing POA in preparation for Indian waters.		Unknown (no information on compliance)	✓
(d) Magnitude of IUU fishing			Poor (limited relevant compliance measures in place)	
			Moderate (some relevant compliance measures in place)	
			Good (comprehensive relevant compliance measures in place)	
	Reasoning/comments: Issues of IUU fishing by IOTC's IUU provisions (IOTC-2016-CoC13-CR27 Rev1). Bay of Bengal IUU fishing plan.			

4.2 Are existing management measures effective/likely to be effective in mitigating pressures affecting the stock/population?									
Factor	Existing management measure(s)	Are relevant data collected and analysed to inform management decisions? (e.g. landings, effort, fisheries independent data)						Is management consistent with expert advice?	
TRADE PRESSURE									
(a) Magnitude of legal trade	Shark fin export ban: Notification No. 110 (RE-2013)/2009-2014. CITES Appendix II listing	No data OR data are of poor quality OR data are not analysed (adequately) to inform management						No expert advice on management identified	
		Limited relevant data are collected AND analysed to inform management						Not consistent	
		Some relevant data are collected AND analysed to inform management				✓		Expert advice partially implemented	✓
		Comprehensive data collected AND analysed to inform management						Consistent	
	Management measure(s) effective/likely to be effective? (circle as appropriate)								
		Yes Partially No		Insufficient information					
	Reasoning/comments:								
(b) Magnitude of illegal trade	Shark fin export ban: Notification No. 110 (RE-2013)/2009-2014. CITES Appendix II listing	No data OR data are of poor quality OR data are not analysed (adequately) to inform management						No expert advice on management identified	
		Limited relevant data are collected AND analysed to inform management				✓		Not consistent	
		Some relevant data are collected AND analysed to inform management						Expert advice partially implemented	✓
		Comprehensive data collected AND analysed to inform management						Consistent	
	Management measure(s) effective/likely to be effective? (circle as appropriate)								
			Yes	Partially	No	Insufficient information			
	Reasoning/comments: Exporters are exporting fins despite the ban, often declaring them as "dried fish products".								
Factor	Existing management measure(s)	Are relevant data collected and analysed to inform management decisions? (e.g. landings, effort, fisheries independent data)						Is management consistent with expert advice?	

FISHING PRESSURE					
(a) Fishing mortality (retained catch)	Closed seasons for all mechanised fisheries. No take zones Gear-specific regulations IOTC Resolution 12/09 on conservation of Thresher Sharks	No data OR data are of poor quality OR data are not analysed (adequately) to inform management		No expert advice on management identified	
		Limited relevant data are collected AND analysed to inform management		Not consistent	
		Some relevant data are collected AND analysed to inform management	✓	Expert advice partially implemented	✓
		Comprehensive data collected AND analysed to inform management		Consistent	
	Management measure(s) effective/likely to be effective? (circle as appropriate)				
		Yes	Partially	No	Insufficient information
	Reasoning/comments:				
	There is limited management expert advice provided by IOTC				

Factor	Existing management measure(s)	Are relevant data collected and analysed to inform management decisions? (e.g. landings, effort, fisheries independent data)		Is management consistent with expert advice?	
FISHING PRESSURE					
(b) Discard mortality	IOTC Resolutions: FADS, Threshers, other sharks National Fins attached policy.	No data OR data are of poor quality OR data are not analysed (adequately) to inform management		No expert advice on management identified	
		Limited relevant data are collected AND analysed to inform management		Not consistent	
		Some relevant data are collected AND analysed to inform management		Expert advice partially implemented	
		Comprehensive data collected AND analysed to inform management	✓	Consistent	✓
	Management measure(s) effective/likely to be effective? (circle as appropriate)				
	Yes Partially No Insufficient information				
	Reasoning/comments: Discard mortality is largely undetermined for IOTC vessels due to the lack of information on survival of species when released. There is no discard of sharks in Indian waters and all retained sharks are utilised completely in different forms. Species-wise catch data are regularly collected from all Indian ports.				

Factor	Existing management measure(s)	Are relevant data collected and analysed to inform management decisions? (e.g. landings, effort, fisheries independent data)		Is management consistent with expert advice?	
FISHING PRESSURE					
	No measures adopted in India (no targeted shark fisheries).	No data OR data are of poor quality OR data are not analysed (adequately) to inform management	✓	No expert advice on management identified	✓
(c) Size/age/	IOTC resolution 17/08 FAD Management Plan	Limited relevant data are collected AND analysed to inform management		Not consistent	
sex		Some relevant data are collected AND analysed to inform management		Expert advice partially implemented	
selectivity		Comprehensive data collected AND analysed to inform management		Consistent	
	Management measure(s) effective/likely to be effective? (circle as appropriate)				
	Yes Partially No Insufficient information				
	Reasoning/comments: Data on size is collected, but there is no information on selectivity of fishing gears.				
(d) Magnitude of IUU fishing	Seasonal closures, No take zones, gear-specific regulations	No data OR data are of poor quality OR data are not analysed (adequately) to inform management	✓	No expert advice on management identified	
		Limited relevant data are collected AND analysed to inform management		Not consistent	✓
		Some relevant data are collected AND analysed to inform management		Expert advice partially implemented	
		Comprehensive data collected AND analysed to inform management		Consistent	
	Management measure(s) effective/likely to be effective? (circle as appropriate)				
	Yes Partially No Insufficient information				
	Reasoning/comments				
	NA.				

Section 5. Non-Detriment Finding and Related Advice

Step 2: Intrinsic biological vulnerability and conservation concern						
Intrinsic biological vulnerability (Question 2.1)			High	Medium	Low	Unknown
Conservation concern (Question 2.2)			High	Medium	Low	Unknown
Step 3: Pressures on species			Step 4: Existing management measures			
Pressure	Level of severity (Questions 3.1 and 3.2)	Level of confidence (Questions 3.1 and 3.2)	Are the management measures effective* at addressing the concerns/pressures/impacts identified? (Question 4.1(b)) *taking into account evaluation of management appropriateness and implementation under Question 4.1(a)			
Trade pressures						
(a Magnitude of legal trade	High	High	Yes			
	Medium	Medium	Partially			
	Low	Low	No			
	Unknown		Insufficient information			
			Not applicable			
(b) Magnitude of illegal trade	High	High	Yes			
	Medium	Medium	Partially			
	Low	Low	No			
	Unknown		Insufficient information			
			Not applicable			
Fishing pressures						
(a) Fishing mortality (retained catch)	High	High	Yes			
	Medium	Medium	Partially			
	Low	Low	No			
	Unknown		Insufficient information			
			Not applicable			
(b) Discard mortality	High	High	Yes			
	Medium	Medium	Partially			
	Low	Low	No			
	Unknown		Insufficient information			
			Not applicable			
(c) Size/age/sex selectivity of fishing	High	High	Yes			
	Medium	Medium	Partially			
	Low	Low	No			
	Unknown		Insufficient information			
			Not applicable			

(d) Magnitude of IUU fishing	High	High	Yes
	Medium	Medium	Partially
	Low	Low	No
	Unknown		Insufficient information
			Not applicable
A) Can a positive NDF be made?	YES - go to B		
B) Are there any mandatory conditions to the positive NDF?	YES - list under Reasoning/comments below and go to C		
C) Are there any other further recommendations?	YES - go to Step 6		
Reasoning/comments:			
This thresher sharks (Alopias spp.) NDF for India is "**positive with conditions**" to enable trade (of non-fin commodities) to continue while improvements are made to existing fisheries and trade management and monitoring systems, and while additional research activities and management measures are adopted as outline in Section 6.			
This NDF will be re-evaluated after 3 years, to gauge progress against the recommendations in Section 6 and update it with newly acquired data, before agreeing to a new NDF for 2023-2026.			

Section 6. Further measures

6.1 Improvement in monitoring or information is required

Monitoring and data recommendations for Thresher Sharks in the Indian Ocean	
Recommendation	Potential leads
Fishery-independent population monitoring and research Distribution and Abundance: Undertake resource-specific exploratory surveys Identify spatial and seasonal thresher shark breeding and nursery aggregations	ICAR-CMFRI in collaboration with the Fishery Survey of India
Fishery-dependent monitoring and research: Fishery monitoring: Improve the existing species-specific landing observation programme, through training and capacity-building of field staff. Look into establishing an informal communication group (e.g. WhatsApp/Google) of shark identification experts (both local and international), to help field staff to identify sharks and/or shark products with a camera photo at short notice. Build upon the developing programme for introducing vessel monitoring systems. Investigate options for introducing mandatory logbook reporting on species-wise landings by fishers Use interviews with fishers to obtain enquiry-based information on shark (by)catch, particularly where access to logbooks is difficult; develop databases for records of species, catch, date and area of capture (geolocation), and gear types. Ensure that species-specific data provided to the Ministry of Agriculture and Farmers' Welfare are passed on to the FAO. Identifying area & season breeding and nursery aggregations of the species, using a participatory approach with fishers. Mandatory catch declaration for thresher sharks by fishers arriving at ports. Review after 3 years and make recommendation if necessary, for addition to protected species list. Research: Undertake biological and stock assessment studies, utilizing data on sex ratios, size/age structure, annual reproductive output, BRPs, and fishing effort collected at landing sites by CMFRI fisheries officers	ICAR-CMFRI, NGOs ICAR-CMFRI State Fisheries Departments ICAR-CMFRI, State Fisheries Departments ICAR-CMFRI Department of Animal Husbandry, Dairying and Fisheries (DADF)ICAR-CMFRI CICAR-MFRI ICAR-CMFRI in collaboration with State Fisheries ICAR-CMFRI, Universities, IOTC Sci Comm & Working Parties
Monitoring of domestic and international trade: Improve the level of trade data reporting – data declaration by traders (species, source of obtaining the product, size of fish (length & weight), quantity, product form). Provide international trade data, as relevant, to CITES, FAO, IOTC. Undertake market survey, interviews with fishermen & traders, collate information from Customs & other databases, and from trade channels Report on the study on the value chain for shark products and the socio-economic status of fishers and other stakeholders. Recommend to the Marine Products Export Development Authority (Ministry of Commerce and Industry) that species-specific codes be added to the current generic product-specific codes for trade records; offer to collaborate with them to develop codes. Promoting the use of genetic analysis by CMFRI for ambiguous products in trade and raise awareness with relevant government departments that this service exists.	ICAR-CMFRI in collaboration with State Fisheries Depts and stakeholders (fishers and traders) ICAR-CMFRI ICAR-CMFRI ICAR-CMFRI & MPEDA ICAR-CMFRI

6.2 Improvement in management is required	
Management recommendations for Thresher Shark in the Indian Ocean	
Recommendation	Potential leads
Strict implementation of each state's Marine Fishery Regulation Act (MFRA) regarding gear, mesh size, operation in no-take zones and closed seasons	State Fishery Department, Coastguard, Marine Enforcement Police
Strengthen Monitoring, Control and Surveillance (MCS)	State Fisheries Departments, Coastguard, Marine Enforcement Police
Improve participatory management and inter-departmental coordination through fishery management councils, as developed under the FAO CCRF	National and State Fishery Management Councils
Create awareness through visual, print and electronic media and mass campaigns	ICAR-CMFRI, NETFISH-MPEDA, NGOs
Seasonal closure of fishing in identified breeding/nursery grounds, if located	States, through MFRAs
Improved surveillance to check for IUU fishing by foreign vessels, and develop protocol for identifying species on board	Indian Navy and Coastguard
Continue to monitor and where necessary improve national compliance with existing fisheries management regulations (national, regional and international), including: ● IOTC Resolution 17/05 on the Conservation of sharks caught in association with fisheries managed by IOTC, including reporting requirements ● IOTC Resolution 12/09 on the Conservation of Thresher Sharks caught in association with fisheries in the IOTC Area of Competence	Department of Animal Husbandry, Dairying and Fisheries (DADF)
Develop and implement the NPOA-Sharks for India, based on the guidance document, with a special focus on plans for shark species listed in CITES and CMS, encourage and take part in regional initiatives to develop a regional shark plan.	ICAR-CMFRI
Support shark conservation efforts and proposals through IOTC, including: · Resolution 17/05 On the Conservation of sharks caught in association with fisheries managed by IOTC; · Resolution 17/07 On the Prohibition to use large-scale driftnets in the IOTC Area; · Resolution 13/06 On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries · Resolution 12/09 On the conservation of thresher sharks (Family Alopiidae) caught in association with fisheries in the IOTC area of competence.	Ministry of Agriculture and Farmers' Welfare ICAR-CMFRI
Urge Ministry of Commerce and Industry to introduce HS codes for all shark products to collect improved data on imports and exports.	MPEDA
Develop a fisher awareness program aimed to: · improve identification of juvenile and pregnant sharks and techniques to maximize live release · improve logbook data recording. ● provide an overview and increase awareness of shark biology, global status, and management measures in place both locally and internationally.	ICAR- CMFRI

Increase awareness for shark processors, traders, and exporters regarding the fin export ban, and CITES requirements for the export of other products derived from CITES listed shark species (this includes export permits accompanied by the Legal Acquisition Finding and Non-Detriment Findings).	ICAR-CMFRI, NGOs
Sign the CMS Sharks MoU to access additional support for the management of shark bycatch.	MOEF&CC (Ministry of Environment, Forest and Climate Change)

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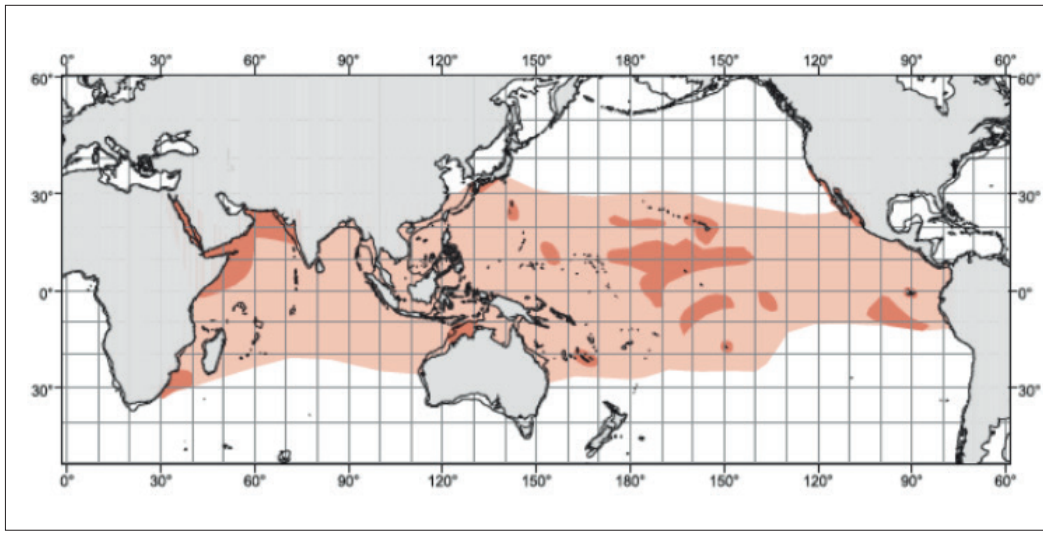
Acronyms

APFIC	Asia-Pacific Fishery Commission
BOBP-IGO	The Bay of Bengal Programme Inter-Governmental Organisation
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMFRI	Central Marine Fisheries Research Institute (India)
CMS	Convention on the Conservation of Migratory Species of Wild Animals
Sharks MoU	Memorandum of Understanding on the Conservation of Migratory Sharks (CMS)
CNCP	Cooperating Non-Contracting Party
CP	Contracting Party (to an RFMO)
CPC	Contracting Parties and Cooperating Non-Contracting Parties
DADF	Department of Animal Husbandry, Dairying and Fisheries
DFD	Demersal Fisheries Division (India), ICAR-CMFRI
EEZ	Exclusive Economic Zone
FAD	Fish Aggregating Device
FAO	Food and Agriculture Organization
ICAR-CMFRI	Indian Council of Agricultural Research-Central Marine Fisheries Research Institute
ICCAT	International Commission for the Conservation of Atlantic Tunas
IOTC	Indian Ocean Tuna Commission
IUU	Illegal, Unreported and Unregulated
MFRA	Marine Fisheries Regulation Acts (of the Indian States)
MoA	Ministry of Agriculture, Cooperation & Farmers Welfare
MoEF&CC	Ministry of Environment, Forests and Climate Change
MOU	Memorandum of Understanding (a non-binding agreement)
MPEDA	Marine Products Export Development Authority (Ministry of Commerce and Industry)
MRAG	Marine Resources Assessment Group (UK)
PERSGA	The Regional Organization for the Conservation of the Environment in the Red Sea and Gulf of Aden
RECOFI	Regional Commission for Fisheries
RFB	Regional Fisheries Body (includes advisory fisheries bodies)
RFMO	Regional Fisheries Management Organisation
SFD	State Fisheries Departments
SIOFA	South Indian Ocean Fisheries Agreement
SWIOFC	Southwest Indian Ocean Fisheries Commission
TAC	Total Allowable Catch
WCPFC	Western and Central Pacific Fisheries Convention

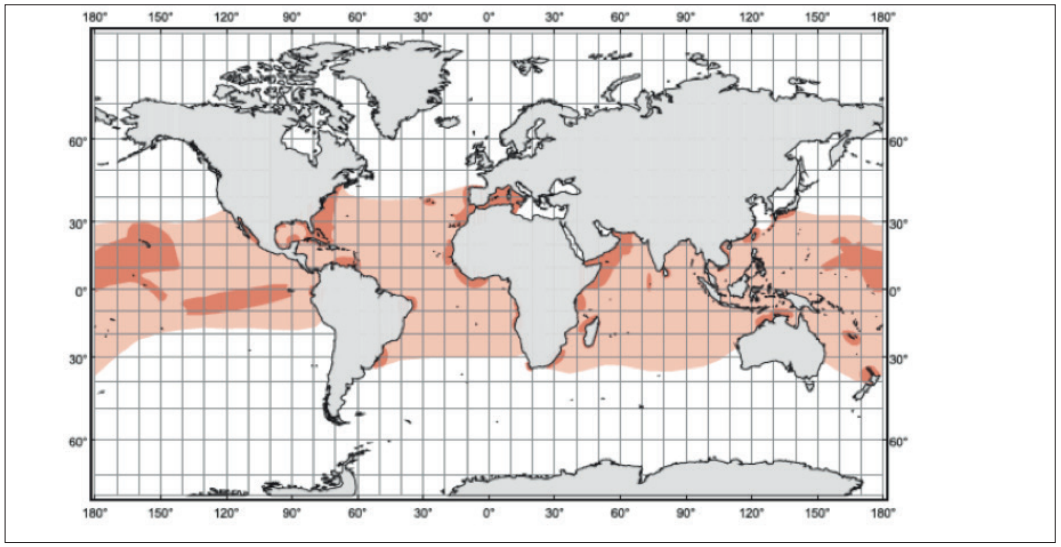
Appendix 1 – Distribution

Global distribution of thresher sharks

Threshers are highly active pelagic sharks with a worldwide distribution in tropical and temperate seas, from coast to open oceans. Oceanic and wide-ranging in the Indo-Pacific, Indian Ocean: South Africa (Kwa-Zulu Natal), Red Sea, Gulf of Aden, Arabian Sea (off Somalia, between Oman and India, and off Pakistan), Australia (northwest Western Australia). Western North Pacific: China, Taiwan, Japan (south-eastern Honshu). Western South Pacific: New Caledonia, eastern Micronesia, Tahiti. Central Pacific: Hawaiian Islands, equatorial waters north of Howland and Baker, Phoenix and Palmyra Islands. Eastern Pacific: USA (California) and the EEZ of Mexico including the Gulf of California), equatorial waters northwest of French Polynesia, and off Galapagos Islands (Compagno 2001).Probably highly migratory and is epipelagic from the surface to at least 152 to 300 m depth (Compagno 2001, Fischer & Bianchi,1984). It aggregates around seamounts and continental slopes (Compagno 2001). There is little information on the predation of pelagic thresher sharks, however being the smallest species among thresher sharks it may well be preyed upon by bigger species such as tiger shark, makos, white sharks, and killer whales.



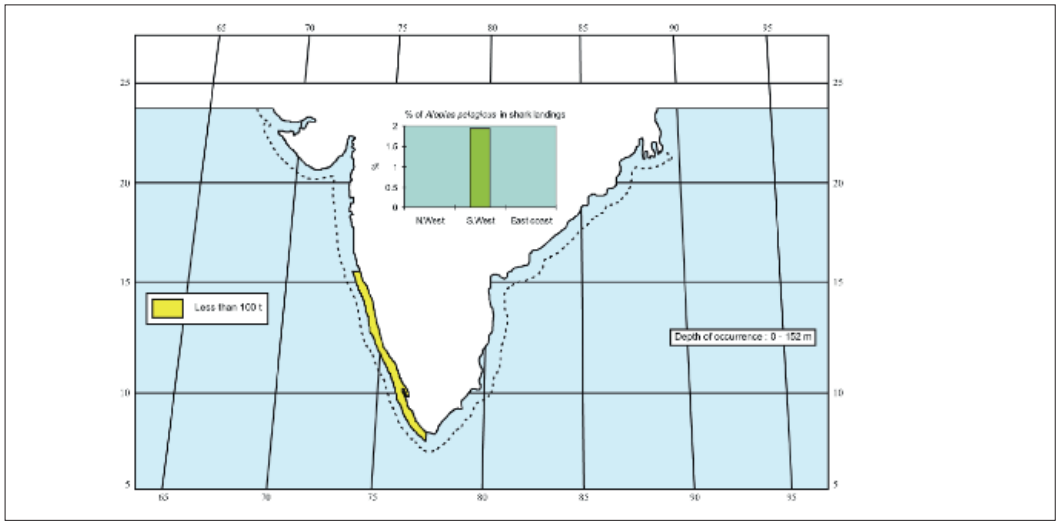
a) Global distribution of Pelagic Thresher *Alopias pelagicus* (Source: FAO).



b) Global distribution of Bigeye Thresher *Alopias superciliosus* (Source: FAO).

The Common Thresher, *Alopias vulpinus*, is unconfirmed in the Indian Ocean (possibly very rare, or records are of misidentified Pelagic thresher).

From Indian waters, *Alopias pelagicus* and *A. superciliosus* are reported. Distribution of the common thresher *Alopias vulpinus* in the tropical Indian Ocean is questionable. Although sporadic occurrences have been reported from Indian waters (Manojkumar and Pavithran, 2006; Joshi *et al.*, 2008), these may well have been the result of misidentification of the species in place of *A. pelagicus* (Vijayakumaran, 1994).



Distribution of *A. pelagicus* along Indian Coast (Raje *et al.*, 2007)

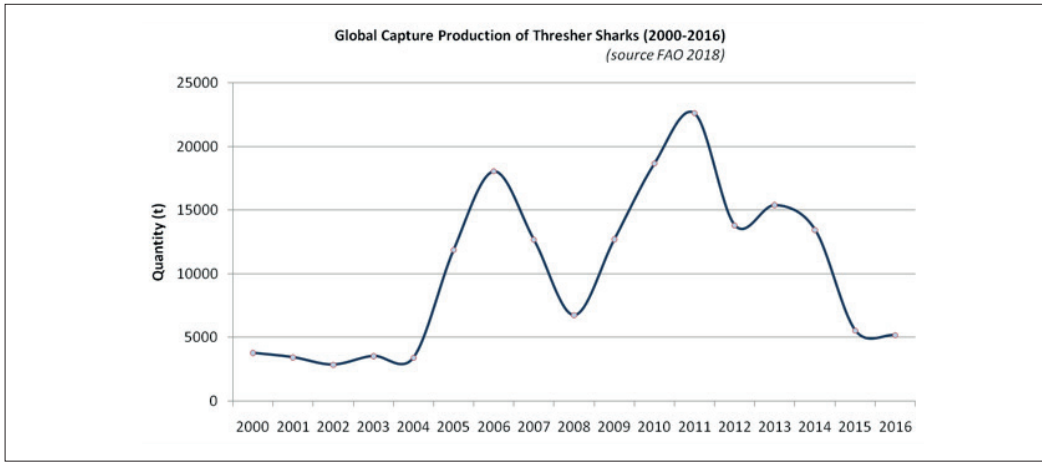
Appendix 2 – Reported catches of thresher sharks

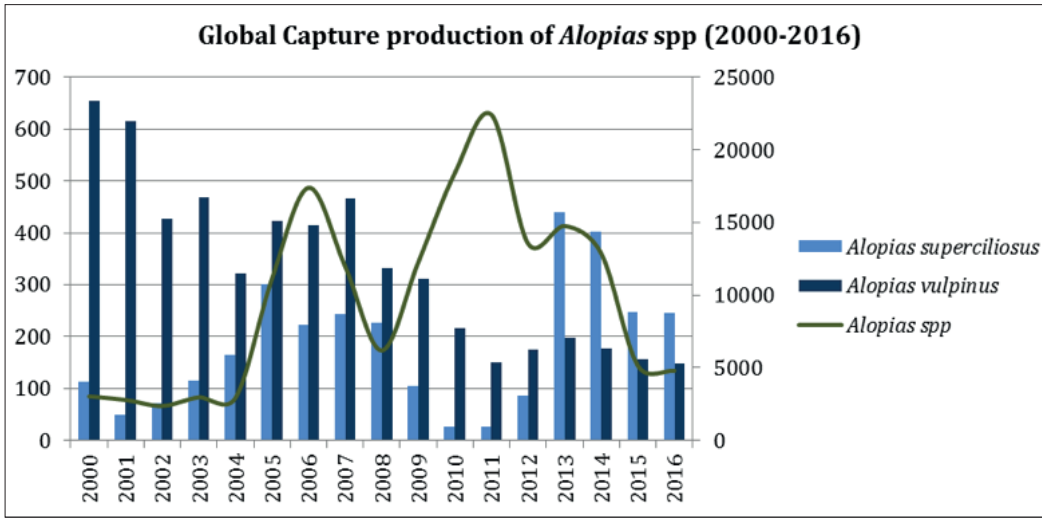
FAO Marine Fishing Areas

Native: Indian Ocean–eastern, Indian Ocean–western, Pacific–eastern central, Pacific–northwest, Pacific–southeast, Pacific–southwest, Pacific–western central.

Global Capture Production of Thresher sharks (all species, t)

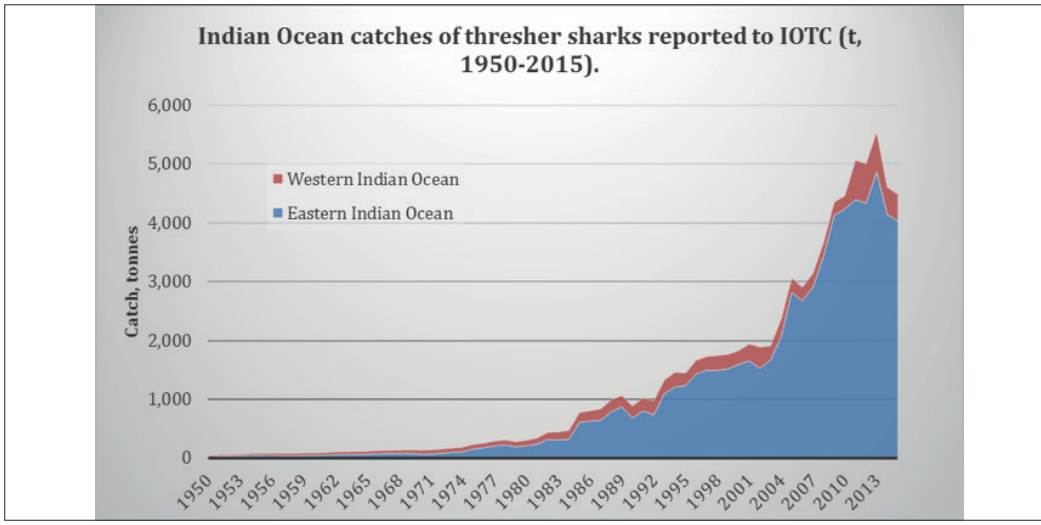
The average global capture production of thresher sharks was estimated at 10221 t during 2000-2016, with maximum during 2011 (2259 t) and minimum during 2002 (2871 t) (FAO, 2018).





Oceanic and global catches of Thresher sharks reported to FAO, t, 2007-2016. Source FAO FishStat.

Indian Ocean	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Indonesia	2,903	3,438	4,128	4,235	4,392	4,333	4,870	4,138	4,028	4,028
Maldives	...	...	...	...	...	...	9	9	1	...
Sri Lanka	69	64	71	197	179	793	...	...	...	...
Other	2	...	1	...	...	...	...	...	...	...
Subtotal	2,974	3,502	4,200	4,432	4,571	5,126	4,879	4,147	4,029	4,028
Pacific Ocean										
New Zealand	35	35	25	19	19	19	19	18	16	14
Indonesia	8,623	2,633	5,684	10,057	16,900	7,701	9,006	8,115	506	155
Taiwan Pr Ch	...	...	580	546	902	655	858	592	576	587
Ecuador	304	–	1,766	3,358	...	...	3	4	...	1
USA	246	185	133	112	91	80	77	52	57	49
Other	...	...	...	...	7	9	3	4	3	1
Subtotal	9,208	2,853	8,188	14,092	17,919	8,464	9,966	8,782	1,156	806
Atlantic Ocean & adj seas										
Spain	62	61	46	0 0	0 0	0 0	...	0 0	0 0	...
Namibia	25	3	20	9	17	42	14	9	11	13
France	38	11	43	27	43	33	33	43	42	37
Italy	8	6	14	4	...	...	21	3	1	-
USA	22	13	12	21	17	55	40	53	51	52
Korea, Rep of	–	–	–	33	...	...	...	...	...	...
Portugal	96	62	70	20	...	1	1	2	1	...
Others	5	10	...	6	3	3	5	6	3	6
Subtotal	256	166	208	120	80	134	114	116	109	108
Global Total	12,438	6,521	12,596	18,644	22,570	13,724	14,959	13,048	5,296	4,943

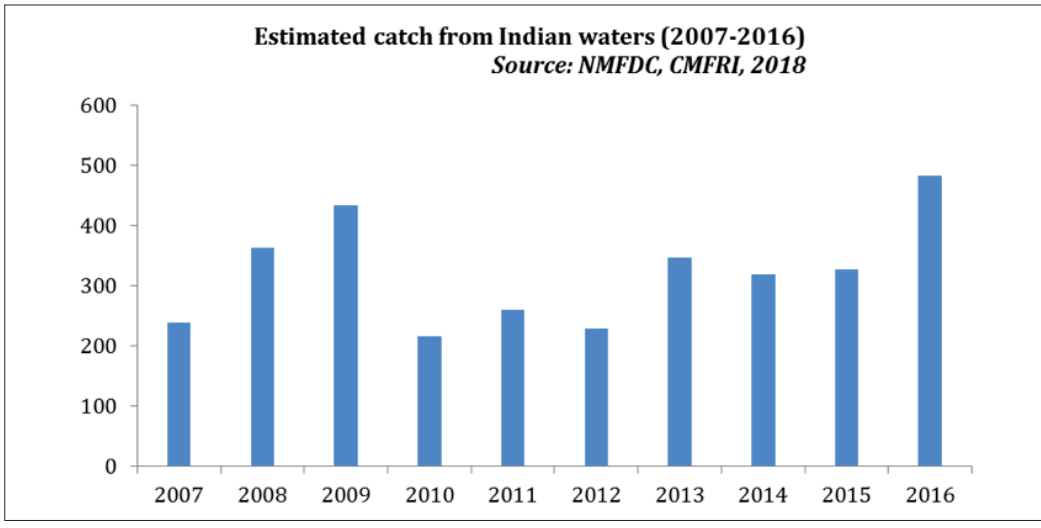


From: http://www.iotc.org/data/datasets

Eastern Indian Ocean catches are primarily reported by Indonesia. Western Indian Ocean catches are primarily reported by Madagascar.

Catch of Thresher sharks in Indian waters

Thresher sharks are taken as bycatch in longlines and gillnets and there is no reported catch by trawl fishing. An average catch of 321 t was estimated for the period 2007-2016, with minimum of 216 t in 2010 and maximum of 482 t in 2016 (NMFDC, CMFRI 2018).



Appendix 3– Life history characteristics

Alopias pelagicus Nakamura, 1935.

Common Name(s): Pelagic Thresher, Thresher Shark, Whiptail Shark

Pelagic thresher shark *A. pelagicus* is with an extremely long upper caudal-fin lobe, relatively large eyes (not extending onto the dorsal head surface), straight pectoral fins and the white ventral coloration not extending above the pectoral and pelvic fin bases. No labial furrows or deep grooves behind the eyes. The colour is pale grey dorsally and ventrally and area above gills and flank region may have a metallic silvery blue (Last and Stevens, 2009).

Pelagic thresher shark: Biology of Indian Ocean pelagic thresher shark (*Alopias pelagicus*).

Longevity	No ageing studies is known for the Indian Ocean, In the Pacific Ocean (China, Taiwan Province) the oldest pelagic thresher sharks reported were a 20 year old male (170 cm SL) and a 28 year old female for fish ~ 188 cm SL. 28.5 years (Liu *et al.*, 1999) from Taiwan
Maturity (50%)	Age: Sexual maturity is attained at 8-9 years (females), 7–8 years (males). Size: Males mature at 254.96 cm TL and females at 271.93 cm TL (Varghese *et al* 2016) in the Indian ocean; Kizhakudan *et al.* (2014) suggest a smaller size at maturity for females in Indian waters. Length at maturity was 264.8 cm TL for males and 285.3 cm TL for females in Indonesian catches (White, 2007).
Reproduction	Pelagic thresher shark is an ovoviviparous species, without a placental attachment. • Fecundity: very low (2) •, Size at birth: 130-140 cm TL; Kizhakudan *et al.* (2014) suggested a smaller size at birth in Indian waters based on observations on free-swimming pups and full-term foetuses ranging in size from 82.9 cm TL to 104 cm TL. • Generation time: 8–10 years • Gestation period: <12 months • Reproductive cycle: unknown Its potential annual rate of population increase under sustainable fishing is thought to be very low and has been estimated at 0.033
Maximum annual pup production (per mature female)	2 pups per litter (Liu *et al.*, 1999, White 2007). May give 40 embryos per female lifetime, if it breeds once every year (Liu *et al.*, 1999)
Size (length and weight)	Maximum size is around 365 cm TL; Maximum size in Indonesian catches was 326 cm TL (White 2007) , 319 cm TL (India, Varghese *et al* 2016). New-born pups are around 158–190 cm TL. Length–weight relationship for both sexes combined in the Indian Ocean is TW=0.001*10-4*FL 2.15243

Alopias superciliosus (Lowe, 1841)

Common Name: Bigeye Thresher

The bigeye thresher Alopias superciliosus has an extremely long upper caudal-fin lobe, huge eyes (extending onto the dorsal head surface) and pronounced lateral grooves on the top of the head (Last and Stevens, 2009).

Bigeye thresher shark: Biology of Indian Ocean bigeye thresher shark (Alopias superciliosus)

Longevity	No ageing studies is known for the Indian Ocean. In the Pacific Ocean (China, Taiwan Province) the oldest bigeye thresher sharks reported were a 19 year old male and a 20 year old female for fish ~ 370 cm TL. Taking into consideration that maximum length is exceed 400 cm longevity is apparently around 25–30 years. In the Eastern Atlantic Ocean, the maximum ages reported in a recent life history study were 22 years for females and 17 years for males.
Maturity (50%)	Age: Sexual maturity is attained at 12–13 years (females), 9–10 years (males). Size: Males mature at 270–300 cm total length (TL) and females at 332-355 cm TL. Size at 50% maturity from the eastern Atlantic Ocean was estimated at 206 cm FL for females (95% CI: 199–213 cm FL), and 160 cm FL for males (95% CI: 156–164 cm FL). 322 cm TL for female and 263.50 cm TL for male (Varghese *et al.*, 2016) from the Indian Ocean
Reproduction	Bigeye thresher shark is an aplacental viviparous with oophagy species.
	• Fecundity: very low (2–4)
	• Generation time: around 15 years (due to oophagy)
	• Gestation Period: 12 months
	• Reproductive cycle: unknown
	Of the thresher sharks, the bigeye thresher has the lowest rate of annual increase, estimated at 1.6% under sustainable exploitation, or 0.002–0.009.
Maximum annual pup production (per mature female)	2 per litter (Benjamin *et al.*,2014.; Varghese *et al.*, 2016)
Size (length and weight)	Maximum size is around 461 cm TL. New-born pups are around 64–140 cm TL. Length–weight relationship for both sexes combined in the Indian Ocean is TW=0.155*10-4*FL 2.97883

Appendix 4 – Status of the Indian Ocean Thresher shark (PTH: *Alopias pelagicus*). IOTC 2017.

Pelagic Thresher Shark Updated: December 2017

EXECUTIVE SUMMARY: PELAGIC THRESHER SHARK

Indian Ocean Tuna Commission

Commission des Thons de l'Oce'an Indien

iotc ctoi

Status of the Indian Ocean pelagic thresher shark (PTH: *Alopias pelagicus*)

TABLE 1. Pelagic thresher shark: Status pelagic thresher shark (*Alopias pelagicus*) in the Indian Ocean.

Area1	Indicators		2016 stock status determination
Indian Ocean	Reported catch 2016:	0 t	
	Not elsewhere included (nei) sharks2 2016:	54,495t	
	Average reported catch 2012–16:	66 t	
	Av. not elsewhere included (nei) sharks2 2012-16:	49,152 t	
	MSY (1,000 t) (80% CI):	unknown	
	FMSY (80% CI):		
	SBMSY (1,000 t) (80% CI):		
	Fcurrent/FMSY (80% CI):		

SBcurrent/SBMSY (80% CI): SBcurrent/SB0 (80% CI):

1Boundaries for the Indian Ocean = IOTC area of competence

2Includes all other shark catches reported to the IOTC Secretariat, which may contain this species (i.e., SHK: sharks various nei; RSK: requiem sharks nei).

Colour key	Stock overfished(SByear/SBMSY< 1)	Stock not overfished (SByear/SBMSY≥ 1)
Stock subject to overfishing(Fyear/ FMSY> 1)		
Stock not subject to overfishing (Fyear/FMSY≤ 1)		
Not assessed/Uncertain		

TABLE 2. Pelagic thresher shark: IUCN threat status of pelagic thresher shark (*Alopias pelagicus*) in the Indian Ocean.

Common name	Scientific name	IUCN threat status3		
		Global status	WIO	EIO
Pelagic thresher shark	*Alopias pelagicus*	Vulnerable	-	-

lUCN = International Union for Conservation of Nature; WIO = Western Indian Ocean; EIO = Eastern Indian Ocean

3The process of the threat assessment from IUCN is independent from the IOTC and is presented for information purpose only

Sources: IUCN 2007, Reardon *et al.* 2009

INDIAN OCEAN STOCK- MANAGEMENT ADVICE

Stock status. There remains considerable uncertainty in the stock status due to lack of information necessary tor assessment or tor the development of other indicators (Table I). The ecological risk assessment (ERA) conducted for the Indian Ocean by the WPEB and SC in 2012 consisted of a semi-quantitative analysis to evaluate the resilience of shark species to the impact of a given fishery, by combining the biological productivity of the species and susceptibility to each fishing gear type. Pelagic thresher shark received a high vulnerability ranking (No. 3) in the ERA tor longline gear because it was characterized as one of the least productive shark species, and with a high susceptibility to longline gear. Despite its low productivity, pelagic thresher shark has a low vulnerability ranking to purse seine gear due to its low susceptibility for this particular gear. The current IUCN threat status of 'Vulnerable' applies to pelagic thresher shark globally (Table 2). There is a paucity of information available on this species and this situation is not expected to improve in the short to medium term. Pelagic thresher sharks are commonly taken by a range of fisheries in the Indian Ocean. Because of their life history characteristics- they are relatively long lived (+ 20 years), mature at 8-9 years, and have few offspring (2 pups every year)–the pelagic thresher shark is vulnerable to overfishing. There is no quantitative stock assessment and limited basic fishery indicators are currently available for pelagic thresher shark in the Indian Ocean. Therefore the stock status is unknown.

Outlook. Current longline fishing effort is directed at other species, however, pelagic thresher sharks are commonly taken as bycatch in these fisheries. Hooking mortality is apparently very high, therefore IOTC Resolution 12/09 prohibiting retaining of any part of thresher sharks

onboard and promoting life release of thresher shark may be largely ineffective for species conservation. Maintaining or increasing effort can result in declines in biomass, productivity and CPUE. However there are few data to estimate CPUE trends, and a reluctance of fishing fleets to report information on discards/non-retained catch. Piracy in the western Indian Ocean resulted in the displacement and subsequent concentration of a substantial portion of longline fishing effort into other areas in the southern and eastern Indian Ocean. Some longline vessels have returned to their traditional fishing areas in the northwest Indian Ocean, due to the increased security onboard vessels, with the exception of the Japanese fleet which has still not returned to the levels seen before the start of the piracy threat. It is therefore unlikely that catch and effort on pelagic thresher shark declined in the southern and eastern areas over that time period, potentially resulting in localised depletion there.

Management advice. The prohibition on the retention of pelagic thresher shark should be maintained. While mechanisms exist for encouraging CPCs to comply with their recording and reporting requirements (Resolution 16/06), these need to be further implemented by the Commission's, so as to better inform scientific advice. IOTC Resolution 12/09 On the conservation of thresher sharks (family Alopiidae) caught in association with fisheries in the IOTC area of competence, prohibits retention onboard, transhipping, landing, storing, selling or offering for sale any part or whole carcass of thresher sharks of all the species of the family Alopiidae .

The following key points should also be noted:

- Maximum Sustainable Yield (MSY): Not applicable. Retention prohibited.
- Reference points: Not applicable.
- Main fishing gear (2012-16): Gillnet-longline; longline-gillnet.
- Main fleets (2012-16): Sri Lanka (reported as discarded/released alive).

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PELAGIC THRESHER SHARK

SUPPORTING INFORMATION

(Information collated from reports of the Working Party on Ecosystems and Bycatch and other sources as cited)

CONSERVATION AND MANAGEMENT MEASURES

Pelagic thresher shark in the Indian Ocean are currently subject to a number of Conservation

and Management Measures adopted by the Commission:

• Resolution 15/0 I *On the recording of catch and effort data by fishing vessels in the IOTC area of competence* sets out the minimum logbook requirements for purse seine, longline, gillnet, pole and line, handline and trolling fishing vessels over 24 metres length overall and those under 24 metres if they fish outside the EEZs of their flag States within the IOTC area of competence. As per this Resolution, catch of all sharks must be recorded (retained and discarded).

• Resolution 15/02 *Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)* indicated that the provisions, applicable to tuna and tuna-like species, are applicable to shark species.

• Resolution 12/09 *On the conservation of thresher sharks (family Alopiidae) caught in association with fisheries in the IOTC area of competence* prohibits fishing vessels flying the flag of IOTC Members and Cooperating non-Contracting Parties (CPCs) from retaining on board, transhipping, landing, storing, selling or offering for sale any part or whole carcass of thresher sharks of all the species of the family *Alopiidae*.

• Resolution 11/04 *On a Regional Observer Scheme* requires data on all shark interactions to be recorded by observers and reported to the IOTC within 150 days. The Regional Observer Scheme (ROS) started on I" July 2010.

• Resolution 05/05 *Concerning the conservation of sharks caught in association with fisheries managed by IOTC* includes minimum reporting requirements for sharks, calls for full utilisation of sharks and includes a ratio of fin-to-body weight for shark fins retained onboard a vessel.

Extracts from Resolutions 15/0/, 15/02, 11/04, 05/05 and 12/09

RESOLUTION 15/01 ON THE RECORDING OF CATCH AND EFFORT DATA BY FISHING VESSELS IN THE IOTC AREA OF COMPETENCE

Para. I. Each flag CPC shall ensure that all purse seine, longline, gillnet, pole and line, handline and trolling fishing vessels flying its flag and authorized to fish species managed by IOTC be subject to a data recording system.

Para. 10 (start). The Flag State shall provide all the data for any given year to the IOTC Secretariat

by June 30th of the following year on an aggregated basis.

RESOLUTION 11 /04 ON A REGIONAL OBSERVER SCHEME

Para. I 0. Observers shall:

b) Observe and estimate catches as far as possible with a view to identifying catch composition and monitoring discards, bycatches and size frequency.

Resolution 15/02 MANDATORY STATISTICAL REPORTING REQUIREMENTS FOR IOTC CONTRACTING PARTIES AND COOPERATING NON-CONTRACTING PARTIES (CPCS)

Para. 2. Estimates of the total catch by species and gear, if possible quarterly, that shall be submitted annually as referred in paragraph 7 (separated, whenever possible, by retained catches in live weight and by discards in live weight or numbers) for all species under the IOTC mandate as well as the most commonly caught elasmobranch species according to records of catches and incidents as established in Resolution 15/01 on the recording of catch and effort data by fishing vessels in the IOTC area of competence (or any subsequent superseding Resolution).

RESOLUTION 05/05 CONCERNING THE CONSERVATION OF SHARKS CAUGHT IN ASSOCIATION WITH FISHERIES MANAGED BY IOTC

Para. I. CPCs shall annually report data for catches of sharks, in accordance with IOTC data reporting procedures, including available historical data.

Para. 3. CPCs shall take the necessary measures to require that their fishermen fully utilise their entire catches of sharks. Full utilisation is defined as retention by the fishing vessel of all pans of the shark excepting head, guts and skins, to the point of first landing.

RESOLUTION 12/09 ON THE CONSERVATION OF THRESHER SHARKS (FAMILY ALOPIIDAE) CAUGHT IN ASSOCIATION WITH FISHERIES IN THE IOTC AREA OF COMPETENCE

Para. 2. Fishing Vessels flying the flag of an IOTC Member or Cooperating non-Contracting Party (CPCs) are prohibited from retaining on board, transhipping, landing, storing, selling or offering for sale any part or whole carcass of thresher sharks of all the species of the family Alopiidae, with the exception of paragraph 7.

Para. 3. CPCs shall require vessels flying their flag to promptly release unharmed, to the extent practicable, thresher sharks when brought along side for taking on board the vessel.

Para. 4. CPCs shall encourage their fishers to record and report incidental catches as well as live releases. These data will be then kept at the IOTC Secretariat.

FISHERIES INDICATORS

Pelagic thresher shark: General

The Pelagic thresher shark (*Alopias pelagicus*) is commonly found in pelagic coastal and oceanic waters throughout the tropical Indo-Pacific (Fig. I). This species is often confused with common thresher shark (*Alopias vulpinus*), which is a predominantly temperate species and often misidentified. In fact most tropical records of common thresher sharks in the Indo-Pacific are considered to be misidentified pelagic threshers. Due to identification issues, the actual distribution and biology of pelagic and common thresher sharks are poorly known. The pelagic thresher is thought to be highly migratory and epipelagic, found in surface waters to depths of 300 m (Compagno 2001). It aggregates around seamounts and continental slopes (Compagno 2001). There is little information on the predation of pelagic thresher sharks, however being the smallest species among thresher sharks it may well be preyed upon by bigger species such as tiger shark, makos, white sharks, and killer whales. Fishing is a major contributor to adult mortality. This species uses its long tail to attack prey (Compagno 2001, Aalbers *et al*. 2010). TABLE I outlines some of the key life history traits of pelagic thresher shark in the Indian Ocean.

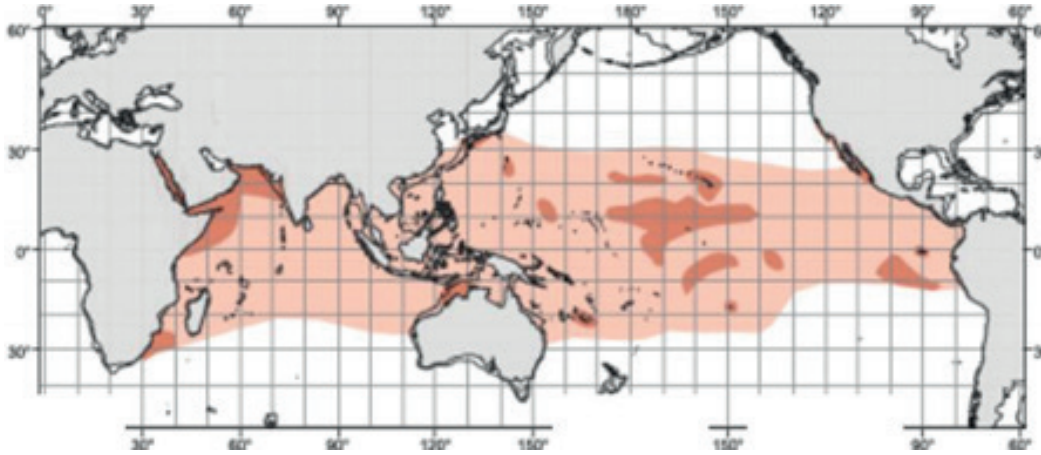

Fig. I. Pelagic thresher shark: The worldwide distribution of the pelagic thresher shark (source: FAO).

TABLE I. Pelagic thresher shark: Biology of Indian Ocean pelagic thresher shark (*Alopias pelagicus*).

Parameter	Description
Range and stock structure	In the tropical Indian Ocean, the greatest abundance of pelagic thresher shark occurs at depths of 50 to 300 m, in temperatures ranging from 8 to 25°C. It is considered as highly migratory species however no published information on horizontal movements of pelagic thresher shark is known for the Indian Ocean. Apparently pelagic thresher shark is a solitary fish, however it is often aggregated around seamounts or over continentall slopes. Area of overlap with IOTC management area • high. No information is availeble on stock structure.
Longevity	No ageing studies is known for the Indian Ocean, In the Pacific Ocean (China, Taiwan Province) the oldest pelagic thresher sharks reported were a 20 year old male (170 cm SL) and a 28 year old female for fish ~ 188 cm SL.
Maturity (50%)	Age: Sexual maturity is attained at 8-9 years (females), 7-8 years (males). Size: Males mature. at 140-145 cm standard length (SL} 240-275 (TL) and females at 280-290 cm TL
Reproduction	Pelagic thresher shark is an ovoviviparous species, without a placental attachment. Fecundity: very low (2) Size at birth: 130-140 cm TL Size at birth: 130-140 cm TL Generation time: 8-10 years Gestation period: <12 months Reproductive cycle: unknown Its potential annual rate of population increase under sustainable fishing is thought to be. very low and has been estimated at or 0.033
Size (length and weight}	Maximum size is around 365 cm TL. New-born pups are around 158-190 cm TL. Length-weight relationship for both sexes combined in the Indian Ocean is TW=0.001*10-4*FL2.15243

Sources: Lui *et al.* 1998, Compagno 2001, Reardon *et al.* 2004, White 2007, Dulvy *et al.* 2008

Pelagic thresher shark: Fisheries

Pelagic thresher shark are often targeted by some recreational, semi-industrial and artisanal fisheries and are also taken as bycatch of industrial fisheries (pelagic longline tuna and swordfish fisheries) (TABLE 2). The typical size of pelagic thresher caught ranges from 120—190 cm FL or 20—90 kg (Romanov pers. Comm.). In Australia thresher sharks used to be targeted by sport fishermen. Sport fisheries for oceanic sharks are apparently not so common in other Indian Ocean countries.

There is little information on the fisheries prior to the early 1970s. Some countries still fail to collect shark data while others do collect it but fail to report to IOTC. It appears that significant catches of sharks have gone unrecorded in several countries. Furthermore, many existing catch records probably under-represent the actual catches of sharks because they do not account for discards (i.e. do not record catches of sharks for which only the fins are kept or of sharks usually discarded because of their size or condition) or they reflect dressed weights instead of live weights. FAO also compiles landings data on elasmobranchs, but their statistics are limited by the lack of species-specific data and data from the major fleets. Thresher sharks were marketed both locally and in European markets until at least up until early 2011 despite IOTC Resolution 12/09. The practice of shark finning is considered to be regularly occurring and on the increase for this species (Clarke *et al*. 2006, Clarke 2008). The bycatch/release mortality rate is unknown but probably high. In longline fisheries pelagic thresher sharks are often hooked by the tail (Compagno 2001) and die soon afterward. Therefore, if not retained, they are usually discarded dead and in most cases discarded sharks are not recorded in fisheries logbooks. Hence the current management measures (notably Resolution 12/09) appear to have limited conservation effect while contributing to further loss of fisheries data. Other types of conservation efforts such as protected areas should be considered for this species group by the WPEB, taking into account a detailed analysis of catch distribution and 'hotspots' of abundance derived from research data. The common confusion between the common and pelagic thresher sharks creates difficulties for data enumerators and means there is a high degree of uncertainty associated with the species-specific data reported.

TABLE 2. Pelagic thresher shark: Estimated frequency of occurrence and bycatch mortality in the Indian Ocean pelagic fisheries.

Gears	PS	LL		BB/TROL/ HAND	GILL	UNCL
		SWO	TUNA			
Frequency	absent	COMMON		Rare	Unknown	Unknown
Fishing mortality	no	High	High	Unknown	Unknown	Unknown
Post release mortality	N/A	Unknown	Unknown	Unknown	Unknown	Unknown

Sources: Boggs 1992, Romanov 2002, 2008

Pelagic thresher shark: Catch trends

The catch estimates for pelagic thresher shark (TABLE 3) are uncertain as is their utility in terms of minimum catch estimates. Only two CPCs, Sri Lanka and India, have reported catches of pelagic thresher sharks in their longline and gillnet fisheries.

TABLE 3. Pelagic thresher shark: Catch estimates for pelagic thresher shark in the Indian Ocean for 2013 to 2015.

Catch		2013	2 014	2015
Most recent catch (reported)	pelagic thresher	0t	0t	0t
	nei-sharks	55,374 t	45,824 t	61,147 t

Note that reported shark catches are incomplete. The catches of sharks are usually not reported and when they are they might not represent the total catches of this species but simply those retained on board. It is also likely that the amounts recorded refer to weights of processed specimens, not to live weights.

A recent project estimated possible thresher shark catches for fleets/countries based on the ratio of shark catch over target species by metier (Murua *et al* 2013). This estimation was based on nominal catches of target species from the IOTC database under the assumption that target catches are declared correctly. The study highlighted that the catch data on thresher sharks in the IOTC database may be a considerable underestimate (i.e. total estimated catches were approximately 70 times higher than that declared in the IOTC database).

Pelagic thresher shark: Nominal and standardised CPUE trends

Data not available at the IOTC Secretariat. There are no surveys specifically designed to assess shark catch rates in the Indian Ocean. Historical research data shows overall decline both in nominal CPUE and mean weight of thresher sharks (Romanov pers com).

Pelagic thresher shark: Average weight in the catch by fishers

Data not available

Pelagic thresher shark: Number of squares fished

Catch and effort data not available.

STOCK ASSESSMENT

No quantitative stock assessment for pelagic thresher shark has been undertaken by the IOTC Working Party on Ecosystems and Bycatch.

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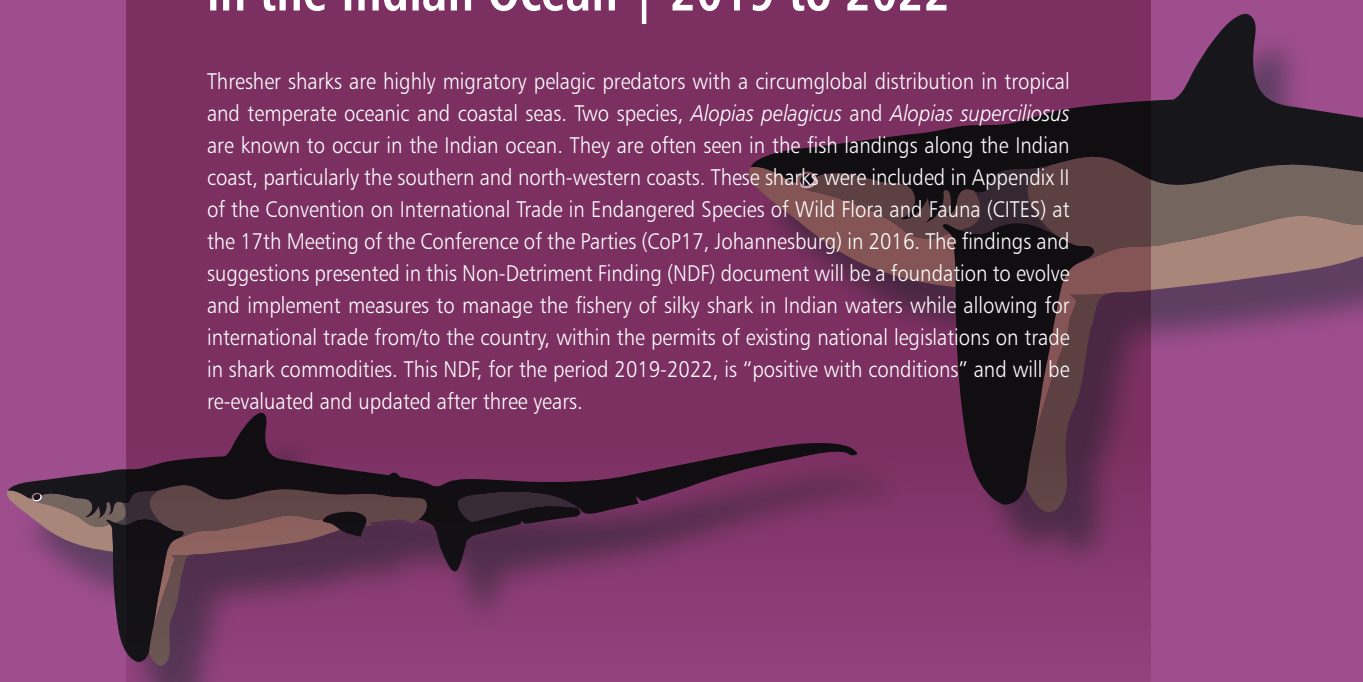
India Non-Detriment Finding for Thresher Sharks *Alopias* spp. in the Indian Ocean | 2019 to 2022

Thresher sharks are highly migratory pelagic predators with a circumglobal distribution in tropical and temperate oceanic and coastal seas. Two species, *Alopias pelagicus* and *Alopias superciliosus* are known to occur in the Indian ocean. They are often seen in the fish landings along the Indian coast, particularly the southern and north-western coasts. These sharks were included in Appendix II of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) at the 17th Meeting of the Conference of the Parties (CoP17, Johannesburg) in 2016. The findings and suggestions presented in this Non-Detriment Finding (NDF) document will be a foundation to evolve and implement measures to manage the fishery of silky shark in Indian waters while allowing for international trade from/to the country, within the permits of existing national legislations on trade in shark commodities. This NDF, for the period 2019-2022, is "positive with conditions" and will be re-evaluated and updated after three years.



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